



FIRST LOOKS

**IBM's L40 May Have
The Best Laptop
Keyboard Yet, but
Is It Worth \$5,995?**

INDUSTRY INSIGHT

**Why OS/2 Flopped:
7 Outrageous
Theories from
John C. Dvorak**

FIRST LOOKS

**40-MHz 386!
First Hands-on
Tests of AMD's
Controversial Chip**

FREE UTILITY

**Restart Windows
The Way You
Left It with
WINSAVER**

MAY 14, 1991

THE INDEPENDENT GUIDE TO PERSONAL COMPUTING

VOLUME 10 NUMBER 9

Presentation Power

PC LABS TESTS

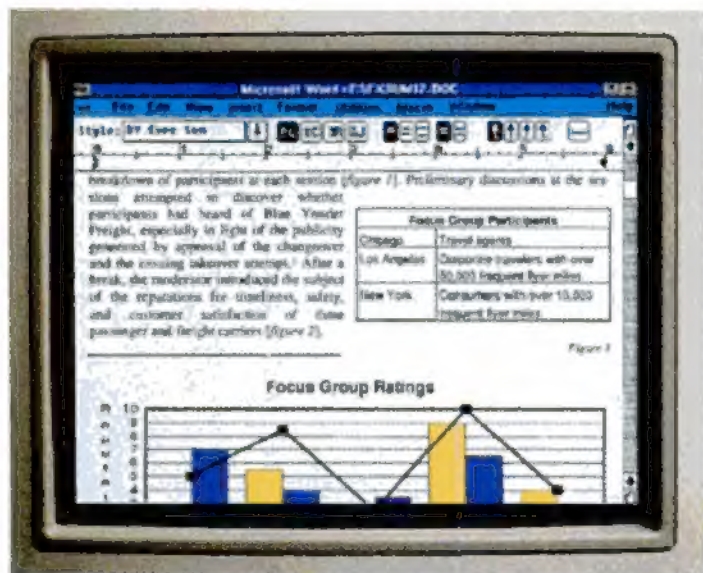
- 14** Presentation Graphics Packages
- 19** Clip-Art Libraries
- 4** Desktop Film Recorders
- 5** Slide Service Bureaus
- 9** Big-Screen Monitors



To open. Open.



Word for Windows redef

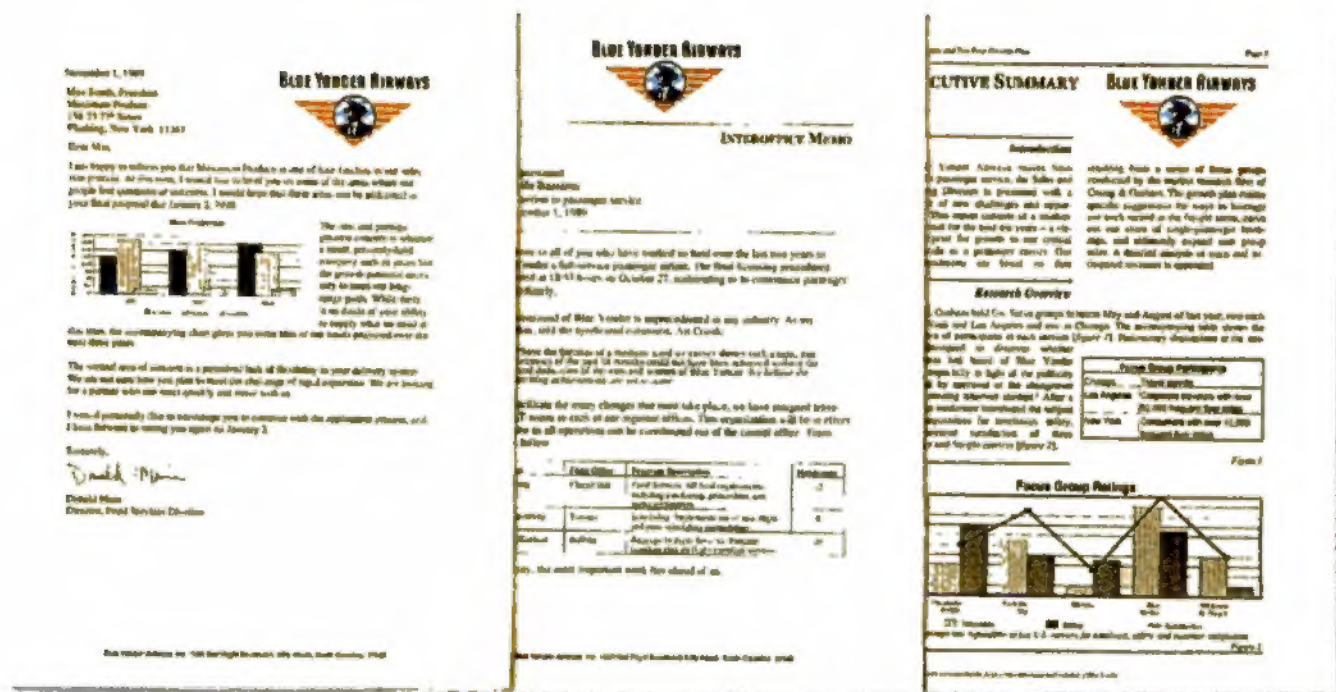


See what you do.
With editable WYSIWYG, you can see
and edit text and graphics formatting.
Virtually everything for that matter.
Right on your computer screen.

Don't get tied up.
Tables make it easy to format
numbers and words into rows
and columns. All without
using the tab key.



Cut corners.
Cut and paste words, graphics,
whatever. On your screen. Without
an endless string of commands.



Look like a professional.
Because we've taken the hard work out of the process,
it's easy to create professional-looking documents.
Making something else look professional. Like you.

ines the word processor.



Just say the word.
Microsoft® Word for Windows.™ The best thing to happen to word processing in quite a while. Check it out. Call (800) 541-1261, Dept. M98.

Save time.
Document Templates make it quick and easy to create standard letters, memos and more. Ensuring consistency. As well as company standards.

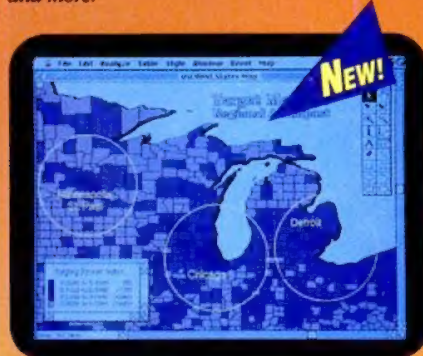
Tailor your documents.
With a point and click, icons on the Ribbon and Ruler allow you to fashion formats from basic to sophisticated. You can even save these formats as a personal style or company standard.

Microsoft
Making it all make sense

SEE YOUR DATA!



New MapInfo for Windows™ and MapInfo for Macintosh™ can find, display, and analyze your data geographically. Overlay data directly from spreadsheets, databases and ASCII files onto maps—from worldwide to street level. We can even supply maps and data for the entire U.S. Street maps, ZIP codes, counties, demographics, and more.



Work with your data in three ways: on maps, graphs, and in traditional rows and columns. Use the built-in SQL querying tools to perform powerful analyses. And now, you can share data across platforms. MapInfo looks and acts the same on Windows and Macintosh.

Now, there are more ways than ever to see your data with MapInfo. Whatever your platform—DOS, Windows™ or Macintosh®—MapInfo can help you see patterns, trends, and opportunities you may have otherwise missed.

MapInfo® Corp.

Changing The Way The World Looks At Information®

200 Broadway Troy, NY 12180
Call 1-518-274-8673 or 1-800-FAST-MAP
for a reseller near you.

MapInfo and Changing The Way The World Looks At Information are registered trademarks of MapInfo Corp. Others are trademarks of their respective owners.

CIRCLE 291 ON READER SERVICE CARD

Inside

PC-based graphics means power over your presentations—you know what you want and you control the outcome. But how do you get from idea to end product? To help you find the right tools for the job, *PC Magazine* has devoted this entire issue to the field of business graphics. Starting out with a roundup of the latest in presentation graphics programs, we explore a number of supporting players: vector clip-art libraries, desktop-priced digital film recorders, large-screen presentation monitors, and (for the first time) five national slide service bureaus with direct links to presentation graphics packages.

Associate editor Rock Miller and project leader Lori Grunin, who are the leaders of *PC Magazine*'s graphics team, approached the subject as end users, not artists or professionals. "In the past, an artist would have to do your whole presentation for you," says Miller. "This was good because you didn't have to worry about it, but it was bad because you had no control." In testing, the team faced frustrations a typical user might. With the slide services, for instance, "Some services processed the slides and returned them without looking at what they'd done," recalls Grunin. Reviewers received some poorly color-matched slides and some with no images at all, and Miller



and Grunin had their share of missed deadlines and order mixups, too.

Grunin, who has a background in economics, approached the software as a data specialist, and found some disturbing holes: "In general, presentation packages still have terrible data handling," she complains, and label and legend handling also leave much to be desired. But with dynamic data exchange (DDE), she notes, the industry is trying to link spreadsheet, word

processing, and drawing packages to allow the graphics to change with the data.

Bringing an artist's eye to the issue was author Luisa Simone. "The art professional knows what will look right on-screen," Simone says. "But average business users need to be able to see what they're doing and be able to correct their mistakes. That's why WYSIWYG and object orientation are so im-

portant." With a Bachelor of Fine Arts degree and several years of experience in publishing production (including three years as executive editor of *PC Magazine*), Simone is a mainstay of our coverage of graphics, from bread-and-butter packages to the most advanced multimedia products.

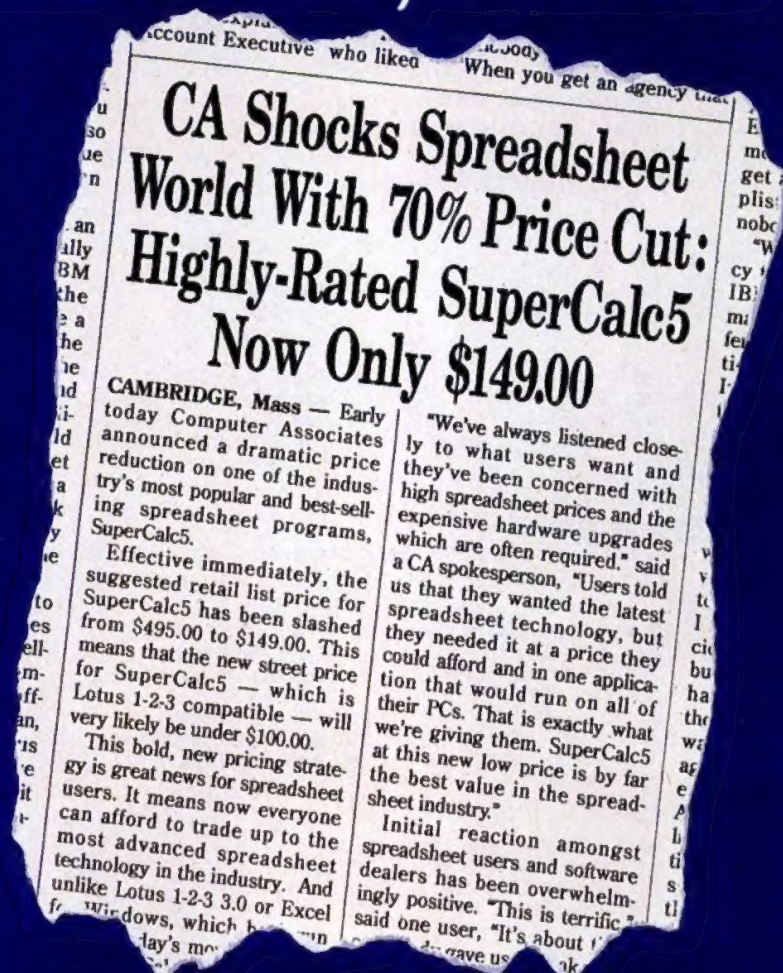
Look here for the software and hardware you need to create good-looking presentations. Then get ready to create shows like a pro.—Julie Cohen ■



Associate editor Rock Miller and project leader Lori Grunin dig into the changing world of business graphics.

PC Magazine: The Independent Guide to Personal Computing. ISSN #0886-6507. Is published biweekly except in July and August for \$44.97 for one year. Ziff-Davis Publishing Co., a division of Ziff Communications Co., One Park Ave., New York, NY 10016. Second-class postage paid at New York, NY 10016 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 54093, Boulder, CO 80521-0993.

Before You Blow \$500 On Lotus 1-2-3, Excel Or Quattro Pro, Read This.



It's the beginning of a revolution.

The affordable spreadsheet revolution. Now every



CA's Computing Architecture For The 90s protects and enhances the value of every CA software solution.

user in America can afford the most advanced spreadsheet technology. The latest breakthroughs. Newest features. Hottest 3-D graphics. It's all there inside SuperCalc5. With Lotus 1-2-3 compatibility, presentation quality graphics and spreadsheet linking, SuperCalc5 has become one of the most popular, best-selling spreadsheets in the industry.



More than 3,000,000 copies have been sold and unlike some others, SuperCalc5 runs on virtually every type of PC that exists.

If you've been thinking about moving up to a more powerful, full-featured spreadsheet, now's the time. Move up to SuperCalc5 and get everything you've always wanted for hundreds of dollars less than Lotus 1-2-3, Excel or Quattro Pro. For the name of your nearest SuperCalc5 dealer call 1-800-CALC-149.

Do it right now. After all, at this price, why wait?



UP FRONT

- 4 INSIDE**
- 15 LETTERS**
- 27 ADVISOR**
Joe Salemi/ Emulate an Epson LQ printer with an HP DeskJet; use add-in cards without hardware-interrupt conflicts; convert graphics files into various formats.
- 33 FIRST LOOKS**
■ **40-MHz power! Bell Computer 386WB-40C** showcases AMD chip.
■ **ProWrite Plus:** Windows word processor for the middle of the road.
■ **Turbo Pascal** promises low-cost Windows development.
■ **Microsoft's BallPoint Mouse** points toward portability.
- 55 NEW AND IMPROVED**
Cristina Córdova and Nate Zelnick
- 65 READ ONLY**
Matthew J. Ross
- 67 PIPELINE**
Gus Venditto

COLUMNISTS

- 75 BILL MACHRONE**
Unreasonable Expectations?
- 81 JOHN C. DVORAK**
OS/2's Flop: Why Did It Happen?
- 83 INSIDE TRACK**
- 87 JIM SEYMOUR**
What's Wrong with Graphics Software...
- 95 WILLIAM F. ZACHMANN**
The Pen Isn't Mightier than the Keyboard

COVER STORY

101 GRAPHICS

Power Presentations: A New, Colorful Era

Rock Miller/ Color presentations are no longer only for special occasions. Business presenters have more options than ever when it comes to media for presenting your messages.

107 PRESENTATION GRAPHICS

Luisa Simone/ Creating the perfect presentation is never simple, but the right tools make the job much simpler. Find the best one for you in this review of 14 presentation graphics packages.

- 123 Applause II
- 124 CA-Cricket Presents
- 130 Charisma
- 132 DrawPerfect
- 133 Freelance Graphics for OS/2
- 145 Freelance Plus
- 160 Harvard Graphics
- 164 ImageStation
- 171 Kinetic Words, Graphs & Art

- 174 Microsoft PowerPoint
- 178 Pixie
- 182 Presentation Team
- 184 35mm Express and Presentation Express

110 Preview of Coming Attractions: Persuasion and Freelance Graphics for DOS Stretch the Envelope

203 CLIP ART

Luisa Simone/ Sometimes your presentation needs that extra little something. So add a picture from one of these 18 clip-art libraries and edit it to your heart's content.

- 212 ArtRight Image Portfolios
- 214 Arts & Letters
- 217 ArtWare Graphics Pak
- 222 Click & Clip 500
- 222 ClickArt EPS
- 227 Clipables: The EPS Graphics Library
- 232 Cliptures
- 236 Desktop Art
- 238 Digit-Art
- 242 DrawArt Professional
- 242 ImageFile
- 252 Images With Impact!
- 255 Micrografx ClipArt
- 257 Moonlight Artworks Collection
- 263 PicturePak
- 270 Presentation Task Force
- 272 ProArt Professional Art Library
- 273 Totem Color Clip Art

- 206 From Stock Clips to Custom Drawings: Getting the Most Out of Clip Art**
- 212 Editors' Choice**
- 230 Summary of Features**
- 236 A World of Clip Art**



277 SLIDE SERVICE BUREAUS

Kellyn S. Betts/ Using special drivers and custom communications packages, these five national slide service bureaus make color slide creation direct and straightforward.

- 284 Autographix Overnight Slide Service
- 288 Genigraphics Corp.
- 293 Kinetic Presentation Centers
- 299 MAGICorp
- 302 Slidemasters Inc.

- 278 Stalking the Regional Jungle**
- 282 Editors' Choice**
- 284 Output Quality**
- 290 Summary of Features**

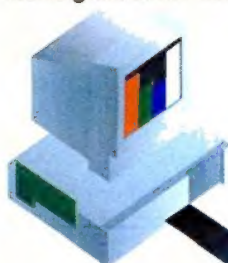


- 122 Editors' Choice**
- 134 Beyond the Screen Show: PC-Based Presentation Packages**
- 146 Summary of Features**
- 170 How We Tested: Presentation Graphics Packages**

COVER STORY

305 FILM RECORDERS

Alfred Poor/ If you don't want to go through an outside slide service, a desktop film recorder can give you good-looking slides for less than \$9,000—with a little trouble.



- 308 From Screen to Screen: How a Film Recorder Works
- 312 Every Little Bit Helps: Color Theory for Film Recorders
- 318 Editors' Choice
- 324 Summary of Features
- 328 Output Quality
- 332 Evaluating Slide Quality
- 334 Performance Tests

- 322 Agfa ProColor
- 324 Lasergraphics LFR
- 328 Polaroid Digital Palette CI-3000
- 329 Presentation Technologies Montage FR1



FEATURES

347 PRESENTATION MONITORS

Alfred Poor/ Nine 25- to 35-inch monitors from Barco, Mitsubishi, and NEC will help turn your next presentation into a sophisticated multimedia event. They all handle VGA (and EGA) graphics. Most of the monitors can play videotapes, and some even come with speakers.

- 356 Barco Multidata OCM 2846
- 358 Barco Multidata OCM 3346
- 359 Barco Multidata SCM 2846
- 363 Mitsubishi AM-3151A
- 363 Mitsubishi AM-3501R
- 370 Mitsubishi HC3505SK
- 373 Mitsubishi XC-3310C
- 373 Mitsubishi XC-3715C
- 374 NEC DM-3000P
- 348 Understanding your Monitor: A Guide to Video Terms
- 350 Editors' Choice
- 352 Why a Monitor Isn't a TV
- 356 Summary of Features
- 366 Performance Tests

AFTER WORDS

505 AFTER HOURS

■ After Hours looks at a variety of car simulations for PC-based auto enthusiasts.

510 ABORT, RETRY, FAIL?

Bill Howard



- 396 PC MagNet News
- 447 Direct Marketing Connection
- 471 Marketplace Index to Advertisers
- 508

- 500 Editorial Product Index
- 461 Reader Service Card
- 501 Coming Up
- 502 Advertisers' Product Index
- 470 Premier

PRODUCTIVITY

379 LAB NOTES

Winn L. Rosch/ The IDE Interface and the Quest for Better Hard Disk Performance

391 UTILITIES

Richard Hale Shaw/ Restore your Windows 3.0 Sessions with WINSaver.EXE

399 ENVIRONMENTS

Charles Petzold/ Comparing the OS/2 2.0 and Windows 3.0 Palette Managers

405 POWER PROGRAMMING

Ray Duncan/ Dynamic Data Exchange and the Clipboard in Windows

415 WINDOWS

William S. Hall/ Uninstall applications once and for all; once you've installed HIMEM.SYS, your applications can access extended memory only through the XMS API; if you insist on bargain hardware, you may be giving up compatibility with Windows 3.0.

421 DATABASES

Sal Ricciardi/ Use one report form to generate several different reports in FoxPro; trick dBASE IV's report generator into accepting macro substitution in calculated fields.

425 SPREADSHEETS

Craig Stinson/ Keep track of the days with a pop-up monthly calendar in Lotus 1-2-3.

429 THE WORKING WORD

Costa Rodis/ Stop watching the clock: This macro flashes the time right on your screen; use a menu to change directories in WordPerfect.

433 USER-TO-USER

Neil J. Rubenking/ Repeat DOS commands without retyping them; identify file types with this clever batch file.

437 LANGUAGES

Trudy Neuhaus/ 2DIR.C lets you compare two directories; upgrade to the new version of Power Basic and gain network support.

441 TUTOR

Jeff Prosser/ Understand what you're doing when you configure your system; speed up your hard disk with FASTOPEN and SMARTDRIVE.

445 CONNECTIVITY

Frank J. Derfler, Jr./ Manage users by limiting their disk space; sharing data across town; connecting two screens and two keyboards to one PC; easier printer sharing; the right long-distance connection.



Editor-in-Chief and Publishing Director Bill Machrone

Editor Joel Dreyfuss

Executive Editors Bill Howard, Gus Venditto

Workgroup Systems Editor Frank J. Derfler, Jr.

Senior Editors Trudy Neuhaus (Productivity), Robin Raskin (First Looks)

Senior Editor, West Coast Christopher Barr

Managing Editors Diane D'Angelo, Paul B. Ross

Manager, Copy Edit Karen A. Carter **Associate Editors** Julie Cohen (PCs), Mary Kathleen Flynn (Hardware), Jonathan Matzkin (After Hours), Rock Miller (Graphics), Sharon Terdeman (Productivity), Don Willmott (Software), Jennifer Zaino (Connectivity) **Technical Editor** Neil J. Rubenking **Copy Chief** Glen Becker **Assistant Production Editors** Jeanne Albrecht, Alan Cohen, Wendy Murch **Staff Editors** Michael Cohn, Gayle C. Ehrenman, Carol Levin, Oliver Rist, Matthew J. Ross, Ann Sherman, Craig L. Stark, Tom Unger **Assistant Editors** Karen Best, Robin B. Bornstein, Cristina Córdova, Gavin Edwards, Stephanie Izarek, Ellyn McCasland, Michael W. Muchmore, Ann Ovodow, Kim Schueler, Shari L. Serio **Editorial Assistants** Eric Berlin, William P. Flanagan, Angela Gunn, Catherine Kunkemuehler, Emerson A. Torgan, Susan Paige York, Nate Zelnick **Proofreaders** Daniel A. Begun, Chris Regan **General Business Manager** Tom McGrade **Associate Business Manager** Allen Wollman **Network Manager** Joe Rizzo **Librarian** Thomas W. Giebel **Assistant to the Publishing Director** David Baker **Assistant to the Executive Editors** Christina M. Evelyn **Administrative Assistant** Christina Okang **Database Assistant** Dolores Williams

Contributing Editors Frank Bican, Douglas Boling, Bruce Brown, Ray Duncan, John C. Dvorak, Mitt Jones, Michael J. Mefford, Edward Mendelson, Bill O'Brien, Charles Petzold, Alfred Poor, Jeff Proise, Winn L. Rosch, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone, Ethan Winer, William F. Zachmann

Support Associate, PC MagNet Christopher T. Parker **Sysops, PC MagNet** Rick Ayre, Jesse Liberty

Director, Design and Electronic Publishing Gerard Kunkel

Art Director Jerry Tortorella **Associate Art Directors** Charles Conover, Renata Gomes, Patricia Isaza, Robert C. Smith **Assistant Art Director** Michael L. Graham **Associate Graphics Director** Gary W. Kaplow **Electronic Graphic Artists** Simone Blank, David Foster, Robin L. Malik **Assistant to the Director of Design** Frieda T. Smallwood

Director, PC Labs C. James Galley III

Technical Director, PC Labs Robert W. Kane **Project Leaders** Richard Brady (Connectivity), Gabrielle Gagnon (Software), Lori Grunin (Graphics), Wendy Dugas Pérez (PCs), Randol Tigrett (PC LAN Labs), Michael J. Zulich (Hardware) **Sr. Programmer** Stuart R. Greenberg **Product Testing Manager** Charles Rodriguez **Sr. Tech. Analyst** Stephen W. Plain Jr. **Tech. Analyst** Mario Baldasserini **Support Technician** Margaret A. Piemonte **Lab Assistants** Laura Cox, Bradley G. Epranian, Carolyn Falconer **Operations Manager** John R. Delaney **Inventory Control Coordinators** Peter Bastide, Rob Graydon, John Jones **Secretary** Ann Jo Sanchez

Publisher Ronni Sonnenberg

Director, Marketing Ellen Atkinson **Events** Stacy O'Connell **Market Information** Michael Van Engen **Sales Development** Jeff Stanley **Subscriptions** Charles Mast **Single Copy Sales** James E. Gerth

Assistant Production Director John Ansaldi **Senior Advertising Production Manager** Vicki Egan Root **Advertising Production Manager** Lori Iaccino **Advertising Production Assistants** Pam Berkowitz, Oris D'Amil **Editorial Production Coordinators** Kevin S. Fagan, Jo-Ann Hirschel **Production Systems Supervisor** Linda Harms **Production Systems Assistant** Lillian Gaffney

Advertising Office: One Park Ave., New York, NY 10016; 800 33 MAG AD, 212-503-5100

Subscription Problems: 800-289-0429, 303-447-9330 (outside the U.S.)

ZIFF-DAVIS PUBLISHING COMPANY

President Eric Hippeau

Executive Vice President J. Scott Briggs

Group Vice President, Mac Publications J. Samuel Huey

Group Vice President, Direct Publications Jim Stafford

Senior Vice President, Marketing Paul H. Chook

Vice Presidents Baird Davis (Operations), Howard D. Skolnik, (Controller), Herbert Stern (Creative Services),

Marian O. White (Research), Bert Lacy (Circulation), James

F. Ramaley (Circulation Systems), Ann Pollak Adelman

(Marketing Services), Roger Hermann (Production),

Frank Kelcz (Europe), Alan Power (Asia-Pacific),

ZIFF COMMUNICATIONS COMPANY

Chairman William B. Ziff, Jr.

Vice Chairman Philip B. Korsant

President Kenneth H. Koppel

Executive Vice President Philip Sine

Senior Vice President Hugh Tietjen

Vice President, General Counsel, and Secretary

J. Malcolm Morris

**What's the
difference
between an
Austin and
a Dell PC?**



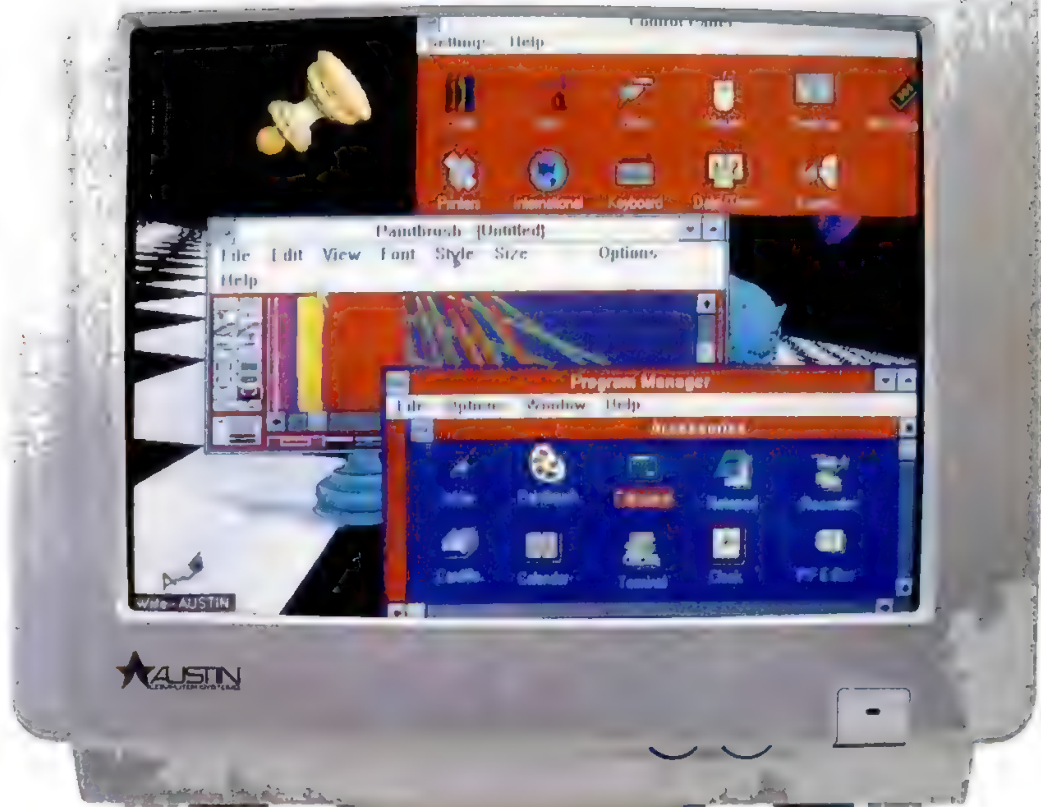
Editors
Choice
386/SX16
1990



Editors
Choice
286/12.5
1989



Editors
Choice
386/SX20
U.K. 1991



386/SX-16

40 Mb Hard Drive
2Mb RAM
Monochrome Monitor
1 Floppy Drive
Microsoft Package
GE On-Site Service

\$1490

Upgrade to VGA Color
System shown \$1890.



The Price.

7 More Great Reasons to Buy Austin.

1 Best PC Value

Austin Computer Systems gives you the best value in a PC purchase. *PC Magazine* Editor's Choice Awards. American-made quality. GE on-site next day service. Top quality components. Toll-free technical support. A 30-day money-back guarantee. 100% financing. Leasing options. Novell Certified NetWare Engineers. Specialized VAR, Government, Education, International and Networking departments. And you get it all for less money!

We believe in giving you more than just a top-quality computer. We also believe in value, and in giving you as much for your dollar as you deserve.

Austin value starts with the Austin WinStations! Your already powerful Austin system comes with the Microsoft Windows Package loaded and ready to go! Just unpack it and plug it in... Microsoft Windows 3.0, DOS 4.01 and a Microsoft mouse are yours—absolutely free!

2 GE On-Site Next Day Service

Every Austin desktop comes with 1 year of GE on-site service. That means we'll have a Service Engineer to your computer site usually within 24 hours! We even offer extended GE contracts for up to five years.



3 30-Day Satisfaction Guarantee

We don't compromise on quality. If your computer is not perfect the entire first year, we'll fix or replace any part immediately and without charge. You can even return your computer within the first 30 days for a full refund on the hardware price, no questions asked.

4 Toll-Free Technical Hotline

If you ever have a technical question, or just need information, you can call our highly trained specialists, six days a week about your Austin computer.

5 Award-Winning Reviews

Don't just take our word for it. Listen to what our customers and the industry experts say:

"The Austin has it all..." *PC Magazine* 386/SX Editor's Choice Award, 1/30/90 Issue

"Austin Computer Systems has a winning combination... How can you lose?" *PC Magazine* 286/12.5

Editor's Choice Award, 1/31/89 Issue

"Austin Computer Systems is on a roll..."

Fredric Burke, *PC Magazine*

Computer Consultant, 9/25/90 Issue

"Austin's 386/25 WinStation is a system loaded with value..."

PC Magazine Editor's Choice Review, 1/29/91 Issue

"Do yourself a favor and check out the Austin 386/SX."

Computer Shopper, April 1990 Issue

"I have found the phone support to be excellent... I recommend them to everyone and would not hesitate to buy another."

Douglas Figgs, New York Engineer, *PC Magazine* Service and Reliability Review, 9/25/90



6 Networking

Businesses can enjoy increased productivity by implementing a Local Area Network to share software and exchange information. Austin Computers is a Novell Gold Authorized Reseller, and our Certified NetWare Engineers can get your business connected today!



7 100% Financing

We offer 100% financing with our Austin Computer Systems Credit Card. Just call and we'll take your application over the phone in minutes! We welcome purchase orders and company checks from our corporate accounts. We'll begin processing approval applications immediately, and will let you know usually the very same day.



VAR 1-800-338-1569 OVERSEAS (512) 339-3500
GSA 1-800-833-4GSA CANADA 1-800-338-1565
FAX (512) 454-1357 NETWORKING 1-800-874-7182
CORPORATE ACCOUNTS 1-800-622-5506
All Time Zones Mon-Fri 7am-7pm Sat 10am-5pm

1-800-752-1577
10300 METRIC BOULEVARD
AUSTIN, TEXAS 78758



That's a Big



\$1090

AUSTIN 286/16

STANDARD CONFIGURATION

Microprocessor: 80286 running at 16MHz.
Special Features: GE on-site service.
Storage: 40Mb IDE hard drive. 1.44Mb or 1.2Mb floppy disk drive.
Memory: 1Mb RAM
Expansion: 7 expansion slots (6 16-bit and 1 8-bit).
I/O Ports: 1 parallel and 2 serial ports.
Video: TTL monochrome monitor with video adapter.
Keyboard: Enhanced 101 keyboard with tactile/click touch.
Compatibility: DOS and OS/2.



\$1890

AUSTIN 386/SX16 WINSTATION

STANDARD CONFIGURATION

Microprocessor: Intel 80386SX running at 16MHz.
Special Features: Pre-loaded with Microsoft Windows 3.0 and MS-DOS 4.01. Microsoft mouse. GE on-site service.
Storage: 40Mb IDE hard drive. 1.44Mb or 1.2Mb floppy disk drive.
Memory: 2Mb RAM
Expansion: 7 expansion slots (6 16-bit and 1 8-bit).
I/O Ports: 1 parallel and 2 serial ports.
Video: 14" VGA color monitor with 16-bit VGA color video adapter.
Keyboard: Enhanced 101 keyboard with tactile/click touch.
Compatibility: DOS, OS/2 and Unix.



\$1990

AUSTIN 386/SX20 WINSTATION

STANDARD CONFIGURATION

Microprocessor: Intel 80386SX running at 20MHz.
Special Features: Pre-loaded with Microsoft Windows 3.0 and MS-DOS 4.01. Microsoft mouse. GE on-site service.
Storage: 40Mb IDE hard drive. 1.44Mb or 1.2Mb floppy disk drive.
Memory: 2Mb RAM
Expansion: 7 expansion slots (6 16-bit and 1 8-bit).
I/O Ports: 1 parallel and 2 serial ports.
Video: 14" VGA color monitor. 16-bit VGA color video adapter.
Keyboard: Enhanced 101 keyboard with tactile/click touch.
Compatibility: DOS, OS/2 and Unix.



\$2590

AUSTIN 386/25 WINSTATION

STANDARD CONFIGURATION

Microprocessor: Intel 80386 running at 25MHz.
Special Features: Pre-loaded with Microsoft Windows 3.0 and MS-DOS 4.01. Microsoft mouse. GE on-site service. Small footprint chassis.
Storage: 90Mb IDE hard drive. 1.44Mb or 1.2Mb floppy disk drive.
Memory: 2Mb RAM
Expansion: 7 expansion slots (6 16-bit and 1 8-bit).
I/O Ports: 1 parallel and 2 serial ports.
Video: 14" VGA color monitor. 16-bit VGA color video adapter.
Keyboard: Enhanced 101 keyboard with tactile/click touch.
Compatibility: DOS, OS/2 and Unix.

AUSTIN 286/16 1MB RAM AND 1 FLOPPY DRIVE STARTING AT \$1090 OR \$33 PER MO.				
CHOOSE MONITOR BELOW				
CHOOSE HARD DRIVE BELOW	TTL MONO CHROME	VGA MONO CHROME	VGA COLOR 640 X 480	
40MB IDE	\$1090	\$1255	\$1470	
90MB IDE	\$1310	\$1430	\$1650	
125MB IDE	\$1440	\$1565	\$1780	
200MB IDE	\$1620	\$1745	\$2180	

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

AUSTIN 386/SX16 WINSTATION 2MB RAM AND 1 FLOPPY DRIVE STARTING AT \$1890 OR \$45 PER MO.				
CHOOSE MONITOR BELOW				
CHOOSE HARD DRIVE BELOW	TTL MONO CHROME	VGA COLOR	1024 X 768 VGA COLOR	
40MB IDE	\$1490	\$1890	\$2035	
90MB IDE	\$1755	\$2095	\$2215	
125MB IDE	\$1885	\$2225	\$2345	
200MB IDE	\$2265	\$2605	\$2725	

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

AUSTIN 386/SX20 WINSTATION 2MB RAM AND 1 FLOPPY DRIVE STARTING AT \$1945 OR \$36 PER MO.				
CHOOSE MONITOR BELOW				
CHOOSE HARD DRIVE BELOW	VGA MONO CHROME	VGA COLOR	1024 X 768 VGA COLOR	
40MB IDE	\$1845	\$1990	\$2180	
90MB IDE	\$2025	\$2240	\$2380	
125MB IDE	\$2155	\$2370	\$2490	
200MB IDE	\$2535	\$2750	\$2870	

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

AUSTIN 386/25 WINSTATION 2MB RAM AND 1 FLOPPY DRIVE STARTING AT \$2220 OR \$67 PER MO.				
CHOOSE MONITOR BELOW				
CHOOSE HARD DRIVE BELOW	VGA MONO CHROME	VGA COLOR	1024 X 768 VGA COLOR	
40MB IDE	\$2220	\$2435	\$2555	
90MB IDE	\$2400	\$2600	\$2735	
125MB IDE	\$2530	\$2745	\$2865	
200MB IDE	\$2910	\$3125	\$3245	

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

Difference!

486/25 NEW ISA Product!



\$3290

AUSTIN 386/33 WINSTATION STANDARD CONFIGURATION

Microprocessor: Intel 80386 running at 33MHz.
Special Features: 128K system cache. Pre-loaded with Microsoft Windows 3.0 and MS-DOS 4.01. Microsoft mouse. GE on-site service. Small footprint chassis.
Storage: 125Mb IDE hard drive with 32K cache. 1.44Mb or 1.2Mb floppy disk drive.
Memory: 4Mb RAM
Expansion: 7 expansion slots (6 16-bit and 1 8-bit).
I/O Ports: 1 parallel and 2 serial ports.
Video: 14" VGA color monitor. 16-bit VGA color video adapter.
Keyboard: Enhanced 101 keyboard with tactile/click touch.
Compatibility: DOS, OS/2 and Unix.

\$3990

AUSTIN 486/25 WINSTATION STANDARD CONFIGURATION

Microprocessor: Intel 80486 running at 25MHz.
Special Features: Internal 8K cache floating point unit. Pre-loaded with Microsoft Windows 3.0 and MS-DOS 4.01. Microsoft mouse. GE on-site service.
Storage: 125Mb IDE hard drive with 32K cache. 1.44Mb or 1.2Mb floppy disk drive.
Memory: 4Mb RAM (expands to 32Mb on system board).
Expansion: 8 16-bit ISA expansion slots
I/O Ports: 1 parallel and 2 serial ports.
Video: 14" VGA color monitor. 16-bit VGA color video adapter.
Keyboard: Enhanced 101 keyboard with tactile/click touch.
Compatibility: Novell, DOS, OS/2 and Unix.

486/33 NEW Product!



\$7990

AUSTIN 486/33 WINSTATION STANDARD CONFIGURATION

Microprocessor: Intel 80486 running at 33MHz.
Special Features: EISA bus architecture. Internal 8K cache and floating point unit. Optional 64K or 128K external cache. Landmark v1.14 rating-167.8 MHz. Power meter rated @ 14.93 MIPS. Shadow RAM. EMS LIMM 4.0 support. Microsoft package. GE on-site service. Vertical chassis.
Storage: 1.2Gb SCSI hard drive. 1.44 Mb or 1.2Mb floppy disk drive.
Memory: 8Mb RAM (expands to 64Mb on system board).
Expansion: 8 32-bit EISA bus master.
I/O Ports: 2 parallel and 2 serial ports.
Video: 14" VGA monochrome monitor. 16-bit VGA video adapter.
Keyboard: Enhanced 101 keyboard.
Compatibility: Novell, DOS, OS/2 and Unix.



\$2295

AUSTIN 386/SX16 NOTEBOOK STANDARD CONFIGURATION

Microprocessor: 80386SX running at 16MHz.
Special Features: Weight under 8 lbs. with battery. Notepad size. Dual removable battery packs for up to 4 hour battery life. Visual/Audio low battery warning indicator. Leather carrying case. Battery and recharger included.
Storage: 20Mb hard drive. 1.44Mb floppy disk drive.
Memory: 1Mb RAM (expands to 8Mb on system board).
Expansion: 2 expansion pack slots. External VGA monitor port. External keyboard port. Printer port. 2 serial ports (1 for modem pack).
Video: Brilliant 10" VGA display with 640 x 480 resolution and 32-gray scale.
Keyboard: Full size embedded numeric pad with 12 function keys.
Compatibility: DOS, OS/2 and Unix.

AUSTIN 386/33 WINSTATION 4MB RAM AND 1 FLOPPY DRIVE STARTING AT \$2820 OR \$85 PER MO.

CHOOSE HARD DRIVE BELOW	CHOOSE MONITOR BELOW		
	VGA MONO CHROME	VGA COLOR	1024 X 768 VGA COLOR
40MB IDE	\$2820	\$3035	\$3155
90MB IDE	\$3000	\$3215	\$3335
125MB IDE	\$3130	\$3290	\$3435
200MB IDE	\$3510	\$3725	\$3845

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

AUSTIN 486/25 WINSTATION 4MB RAM AND 1 FLOPPY DRIVE STARTING AT \$3880 OR \$117 PER MO.

CHOOSE HARD DRIVE BELOW	CHOOSE MONITOR BELOW		
	VGA MONO CHROME	VGA COLOR	1024 X 768 VGA COLOR
125MB IDE	\$3880	\$3990	\$4105
200MB IDE	\$4280	\$4475	\$4595
330MB SCSI	\$4730	\$4945	\$5065
1.2GB SCSI	\$5180	\$5385	\$5515

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

AUSTIN 486/33 WINSTATION 8MB RAM AND 1 FLOPPY DRIVE STARTING AT \$5880 OR \$177 PER MO.

CHOOSE HARD DRIVE BELOW	CHOOSE MONITOR BELOW		
	VGA MONO CHROME	VGA COLOR	1024 X 768 VGA COLOR
330MB SCSI	\$5730	\$5945	\$7065
1.2GB SCSI	\$7080	\$7395	\$8515

OTHER OPTIONS ARE AVAILABLE. CALL FOR DETAILS.

CIRCLE 509 ON READER SERVICE CARD

VAR 1-800-338-1569 OVERSEAS (512) 339-3500
GSA 1-800-833-4GSA CANADA 1-800-338-1565
FAX (512) 454-1357 NETWORKING 1-800-874-7182
CORPORATE ACCOUNTS 1-800-622-5506
All Time Zones-Mon-Fri 7am-7pm-Sat 10am-5pm

1-800-752-1577
10300 METRIC BOULEVARD
AUSTIN, TEXAS 78758



STAT 301 PROF GOSSET 10/11

→ Measures of Central Tendency
 arithmetic mean = "average" = $\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$
 median = middle value
 mode = most common value
 skewness to right  and to left 

→ Measures of Dispersion (or "spread" of the data).
 Variance = $s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$ (unbiased with $n-1$ in denominator)
 Standard Deviation = $s = \sqrt{s^2}$
 Coefficient of Variation (c.v.) = $100 \left(\frac{s}{\bar{x}} \right)$

→ Sampling Distribution of the Mean:
 $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$. We estimate σ with s ; taking large n .
 For $n \rightarrow \infty$, $\bar{x} \sim N(\mu, \sigma_{\bar{x}})$
 (68% within 1 std. error, 95% within 2)

→ Least-Squares Regression:
 Data X , estimates b , dependent values Y
 $Y = Xb \Rightarrow b = (X'X)^{-1} X'Y$
 $\sum_{i=1}^n (y_i - \hat{y}_i)^2$




GOSSET
Student's t

measures of central tendency
 mean = average = $\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$
 median = middle value
 mode = most common value

Meeting in
 Group
 Prob.
 7.20

Normal distribution



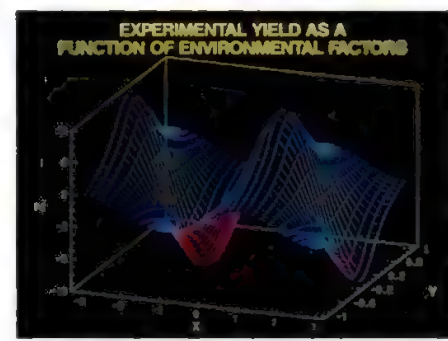
Statistical Graphics Software For Those Of You Who Majored In Statistics. And Those Of You Who Didn't.

If you majored in statistics—heck, if you *understood* statistics—one look at the over 250 built-in statistical functions will tell you that STATGRAPHICS® graduated summa cum laude. If you don't remember the first thing about statistics, don't worry. STATGRAPHICS does. And then some.

Whether you have demographic information, manufacturing yields or instrument readings, STATGRAPHICS can quickly digest thousands and thousands of numbers and calculate the key points you need. How to adjust insurance rates for different classes of drivers in different jurisdictions. Where the production bottleneck really is. What numbers alone won't tell you, STATGRAPHICS will. And then sum up the information in one of over 50 types of graphs that, in the words of PC Magazine, "will knock your socks off."

BY THE NUMBERS.

If you remember all those statistical buzzwords, here are some of STATGRAPHICS:



ANOVA, regression analysis, multivariate and nonparametric techniques, forecasting and time series analysis, quality control, experimental design and much more. If you don't remember any of those, here are some others: On-line help,

handy reference cards, telephone support, training and consulting. Along with the ability to import files from Lotus®, dBASE®, ASCII or DIF formats. And praise from all the major magazines for our ease of use.

**KNOWLEDGE IS POWER.
POWER IS \$995.**

Call today for more information and a free demo disk. If you're a statistician, you're really going to like it. If you're not a statistician, you're going to love it.

STATGRAPHICS

In Maryland, (301) 984-5123. Outside The U.S., (301) 984-5412

(800) 592-0050 Ext. 200

Letters

WE CAN PRAISE WINDOWS, TOO

In response to Bill Machrone's "Welcome to Windows; Bring Your Checkbook" (February 12, 1991): Relax, Bill! Sit back and let me tell you how it's done.

First, you buy *Windows* by mail order (or get it free, since it's bundled with some 386 machines). Mail in your registration. You will receive an invitation to attend a free *Microsoft Windows* Computing Seminar coming soon to your city (if you live in a city big enough to rate a seminar). I did.

You go. It's fun. Then you get a special offer to purchase *Microsoft Office for Windows* (which includes *Word for Windows*, *Excel*, and *PowerPoint*) for only \$250.

Once you order those, you get two more offers: Pioneer Software's *Q&E* (a *Windows*-compatible database editor) for \$9.95, and a Bitstream Fontware package for \$2.50.

All in all, including all the tax and shipping charges, I paid \$411.23 for software worth over \$1,000 retail, maybe \$750 mail order. It may not be the best deal in the world, but one I can live with. There are ways to enjoy *Windows* without being nicked and dined to death.

Donald W. Boatright
San Antonio, Texas

Windows bashing is in! It seems that your Letters column always has at least one *Windows* hater, and in your February 12 issue of this year, both Bill Machrone and Jim Seymour made harsh commentaries about the product. I wonder if your magazine would even publish a defense of *Windows*.

I use computers professionally for real-world development tools. I have been using *Windows* for several months, and I cannot think of any other tool that has more significantly increased my productivity. It enables me to move among applications with a few easy clicks. While I continue to use non-*Windows* applications such as *Paradox* 3.5, *Lotus 1-2-3*, Release 3.1, and *WordPerfect* 5.1, I have not had to purchase any additional software as de-



scribed in Bill Machrone's scenario.

So what's all the fuss?

Randy Grenier
Cambridge, Massachusetts

I've had enough of people wasting ink to write in and express their biased personal opinions about *Windows*. I develop software in C for both *Windows* and DOS. I simultaneously run a DOS command prompt, the *Windows* file manager, and the Brief editor, all in windows. With a single keystroke I can maximize or minimize whatever I am working on. My files are always in view in the file manager. I can switch to the DOS command line with one mouse click and quickly type in whatever I want. Almost every DOS program I have runs under *Windows*, and I can switch back to my graphical environment with a single keystroke. And yes, even with all of these programs running and with things compiling in the background, I can still play solitaire.

Someone please tell me how I can work even faster and more conveniently.

Michael T. Johnson
Natick, Massachusetts

In John C. Dvorak's column (January 29, 1991), he prattles on about the absence of his loyal command line while using *Windows* 3.0. I use *Windows* and the DOS command line together. I always keep a DOS prompt open for the very reasons Dvorak complains about.

Since I am using a 386-based computer, I have run my DOS prompt in a window. This permits me full access to the DOS command prompt as well as to the *Windows* interface. I have the best of both worlds. Try it, J.D.; you'll like it.

John DeRegnaucourt
Dayton, Ohio

CUT OUT THE NOISE!!

I was pleased to read Bill Machrone's comments about the noise levels of PCs ("Desktop Downsizing," January 15, 1991). A noisy PC in the workplace and especially at home is unpleasant, and as noted, renders the PC nearly unusable for composing music.

I am considering upgrading my home PC, and one of the most important things guiding my selection will be the noise level. I hope that *PC Magazine* will soon include in its features tables the actual noise level a user will experience from the PCs you test. Such a figure would be a welcome addition to your professionally done PC reviews.

Roger Freeman
Amherst, Massachusetts

I applaud Bill Machrone's concern about noisy computers, but feel compelled to point out that *PC Magazine* is largely responsible for the noise.

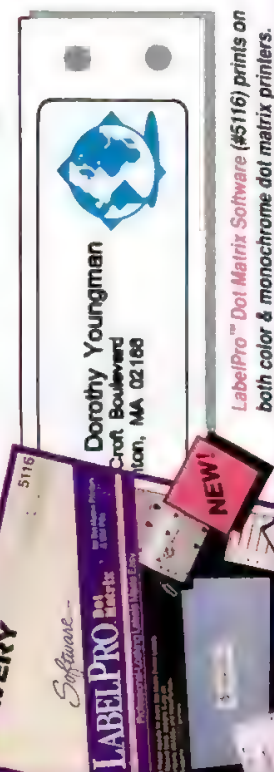
If you spent half as much time comparing decibel output as you do comparing benchmarks, manufacturers would be falling over backward trying to produce quieter machines. As it is, no publication I am aware of makes such comparisons. How about including decibel levels in future comparisons?

Eric Schendel
Albany, California

LABEL TO YOUR ART'S DESIRE WITH LABELPRO Software

Say goodbye to boring labels! Introducing Avery LabelPro™ Dot Matrix and LabelPro™ Laser Software. Preset layouts for Avery Dot Matrix Printer and Laser Printer Labels mean no more time consuming formatting.

Jazz up your labels using built-in clip art, scalable fonts or scan in your logo. Directly imports dBASE® and WordPerfect® lists. Call 1-800-541-5507 for a dealer near you. Retail price each only \$99.95.



Mr. Frank Thorne
3212 Massachusetts
Minneapolis, MN



LabelPro™ Laser Software (\$51.00) supports laser printers, HP® DeskJet.



LabelPro™ Dot Matrix Software (\$51.16) prints on both color & monochrome dot matrix printers.

Letters



PC Magazine Labs constantly refines the methods used to test products, and noise-level tests for PCs is currently under consideration.—Ed.



AN AMAZING PRICE

Reader Michael D. Lore's "Pretty Windows" letter in your February 12, 1991, issue stated that he spent \$35 for Microsoft Windows 3.0.

Where did Mr. Lore find such a great price for Windows 3.0?

Harold Noffke
Fairborn, Ohio



BATTLE OF THE OPERATING SYSTEMS

I have been following with interest the battle for the future, which is currently being waged among supporters of DOS, Windows, OS/2, and Unix. It seems to me that this is how matters currently stand: DOS is dead, but it isn't dead; Windows is the future, but not *the* future; OS/2 is ultimately where we're going, except that it isn't going anywhere; and Unix is what everyone seems to want to avoid, but it's already here (unfortunately, it resembles Cyrano de Bergerac: a good fighter, but not much to look at).

Confused? You bet. When the smoke clears and the all clear sounds, I will emerge from my bomb shelter and see who has won. Unfortunately, since the main thrust of the struggle seems to be who gets to make the most money out of all of this—Microsoft or IBM—I can't get excited enough to become a combatant.

Ken Smith
Seattle, Washington



LESS IS MORE

I wonder why the word processor world has not realized that less is more in spell-checker functions. As spell-checker dictionaries get larger, the number of spelling errors also increases. Two common examples of keyboard errors that will pass most spell-checkers: *for* written as *fro*, and *manager* written as *manger*. (I have found many more!)

I would love to see smaller versions of dictionaries that concentrate on the common words used in business and leave managers for the livestock industry.

Stephen H. Maxwell
Clarksburg, West Virginia

A 486 WITHOUT COPROCESSOR

Far be it from me to complain about your magazine, but (you knew there had to be a *but*), I have a bone to pick concerning your article, "Math Coprocessors: Fact or Fantasy" (February 12, 1991).

In this article, you display the results of tests on an Intel 80486 *without* coprocessor. Though it is stated that without-

DOS is dead, but it
isn't dead; Windows
is the future, but not
the future; OS/2 is
where we're going, but
it isn't going anywhere.

coprocessor tests are performed in RAM, why would you do this with a 486? An Intel 80486 *cannot* be purchased in a non-coprocessor configuration. In fact, what could be called the Intel 80487 (which doesn't exist) is built directly into the 486.

Miguel M. Perez
Little Ferry, New Jersey



The tests performed "without coprocessor" involve calculations that are performed within the CPU. In the case of an 80486, you are correct; the microprocessor can be purchased only with the built-in math coprocessor. But the test result you specify did not utilize the math coprocessor circuitry located within the 80486. It demonstrates solely the processing power of the 80486's CPU.—Ed.



ENVIRONMENTALLY CONCERNED

When the latest issue of *PC Magazine* showed up on my doorstep, three things came together almost like some type of astrological occurrence: John Dvorak's column about another blockbuster issue of your magazine, comments about the paperless office, and my quarterly clearing out of old *PC Magazines*.

As I looked at the large pile, I noticed they are printed on slick glossy paper, totally nonrecyclable. In this day and age of disappearing landfills and solid-waste problems, I think that publishers should



PC WEEK \ REVIEWS

Tri-Star Leads 33MHz 486 PC Pack

Software Perform Well; Video and Hard-Disk Components

Tri-Star Leads 33MHz 486 PCs

By David Claiborne

by David Claiborne

EIS Technologies Inc., First Computer Systems Inc., Insight Computers, Micro Express PC Automation

Notes: As the number of individuals in the sample increases, the probability of finding a significant difference between the two groups increases.

Tri-Star Computer continues to outdistance the pack as America's preferred supplier of high-end 486 Workstations. Read the reviews and you will understand why Tri-Star is the undisputed 486 champ.

"Tri-Star is king of the 33MHz 486 Mountain." PC WEEK Analyst's Choice, February 18, 1991

"Tri-Star's 486/25 rates honorable mention for its thoughtful design touches, two year warranty and excellent service program."
PC Magazine
Editor's Choice Honorable Mention,
September 11, 1990

"Tri-Star's edge is its good documentation and excellent service policy." PC Sources 486/33 Lead Review, February 1991

FLASH CACHE 486 COMPUTERS

FEATURES INCLUDE:

Intel 80486 Processor
8MB RAM (Expandable to 64MB On Board)
64K High Speed Static RAM Cache
210MB 15ms Hard Disk Drive
1.2MB 5.25-inch Floppy Drive
1.44MB 3.5-inch Floppy Drive
1024 x 768 SVGA Adapter w/1MB RAM
14" Non-interlaced SVGA Color Display
Microsoft DOS 4.01 & Windows 3.0
High Res 400 DPI Three Button Mouse
Quality 101-Key Tactile Keyboard
Two Serial Ports and 1 Parallel Port
Fully DOS, UNIX & Novell Compatible

FC425I
\$3895

FC433i
\$4295

UPGRADES:

16" COLOR DISPLAY	\$695
20" COLOR DISPLAY	\$1695

**Flash Cache 33MHz 386 as above with
4MB RAM & 125MB Hard Drive
—Only \$2695**

ALL FLASH CACHE COMPUTER SYSTEMS INCLUDE:

- 2 Year Parts & Labor Warranty
- 60 Day Money Back Guarantee • 12 Month On-Site Service • Overnight Parts Replacement
- Lifetime Toll-Free Technical Support

All prices and specifications subject to change without notice. We accept MasterCard & Visa (No Surcharge), AMEX (3% Surcharge), or CDD/University & Corporate H.Q.s are welcome. (1-800-188-253). Money Back guarantee does not include shipping charges. On-site service available in most U.S. locations. 2 Year Warranty includes system and keyboard, non-WI-SI owned peripheral items such as printers and monitors are covered for 1 Year. All systems have been verified or certified to comply with part 15 of the FCC rules for a Class A or Class B computing device. FCC Class A systems not intended for home use. Fan/CAD is a registered trademark of Evolution Computing. 386 & 486 are trademarks of The Intel Corporation. Product names registered herein may be trademarks and/or registered trademarks of their respective companies.



1.800.678-2799

707 West Geneva, Tempe, Arizona 85282

Tech Support 1.800.688-TECH

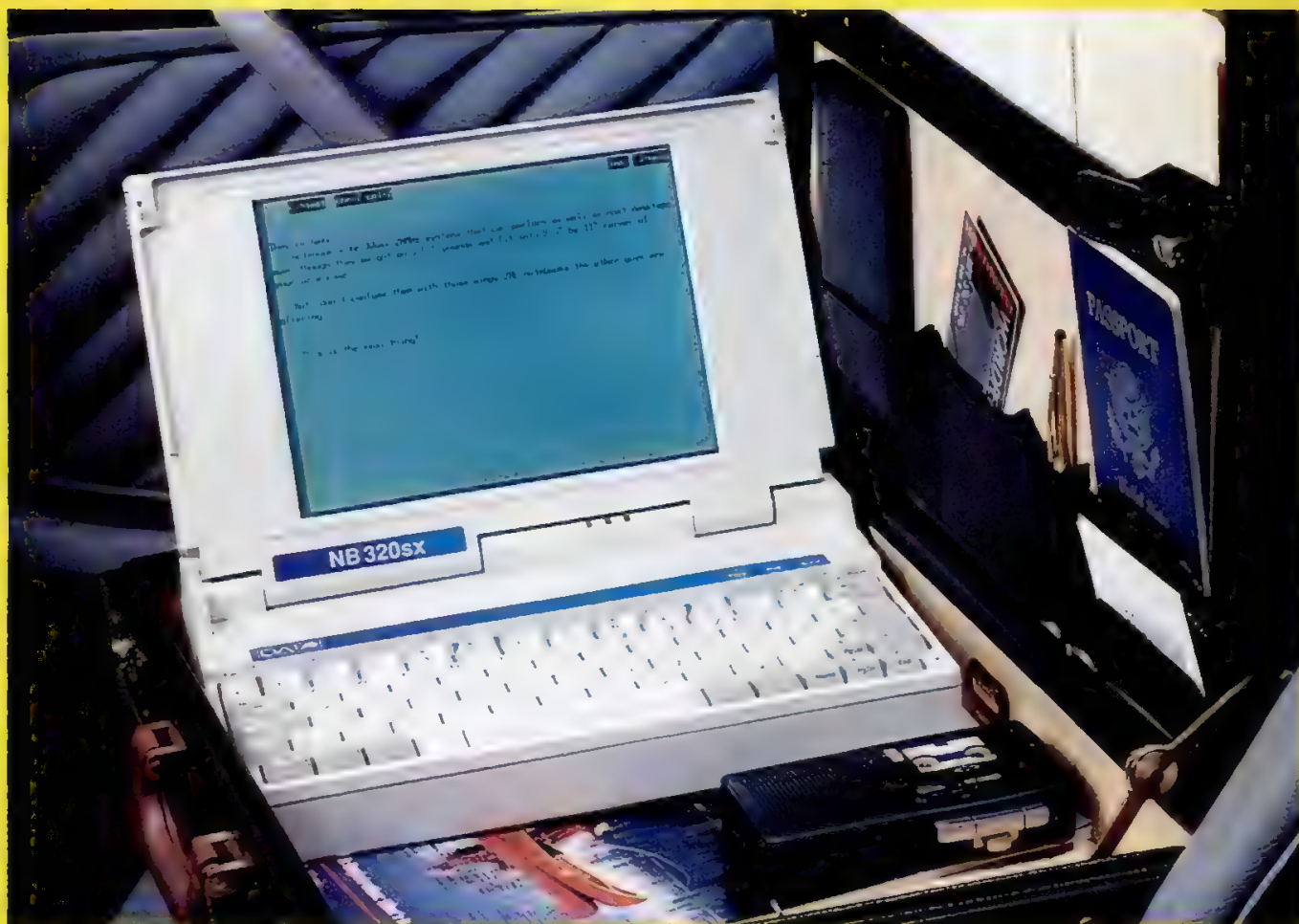
Telephone 602.829-0584

Fax 602.345-0110

Monday - Friday 7:00am-7:00pm MST

Saturday 9:00am-4:00pm MST

"A SOLID, COMPLETE MACHINE FOR THE REST OF



The NB-320SX Notebook has a host of features that make it the smart choice. At 6.5 pounds it is ideal for the person on the go, and its Intel 386SX 20 MHz CPU the NB-320SX is powerful enough for practically any job. The high-resolution triple-twist screen displays up to 32 shades of gray, in either normal or reverse video modes for improved clarity. The rechargeable D-cell battery pack lasts 2 to 3 hours and can be easily recharged, using the AC adapter. And the NB-320SX allows you to expand memory to 16MB, a feature unmatched by other notebooks! Its unique suspend mode minimizes battery drain, yet returns the screen to where it was when turned off, with no rebooting necessary. On top of all this, the optional three-slot cabinet allows additional expansion capabilities and with the optional internal modem the NB-320SX is a complete communication machine!

With all its standard features and powerful options, the NB-320SX is a tough machine to beat!

Check it out — the notebook that sets the standard for the rest of the industry!

NB/320SX \$2,650

20MHz/LCD VGA/2MB/20MB HD

NB-320SX Notebook Standard Features

- Intel 386SX 20MHz CPU
- LCD VGA Back-lit Super Twist Screen 640x480
- High-Speed 20MB Hard Drive
- 80387SX Coprocessor Support
- 3.5" 1.44MB floppy
- Suspend Mode To Halt And Later Resume Work
- 1 parallel, 2 serial ports
- 12 Function Keys
- Special Large Enter Key
- Connector for External 101 or PS2 Full-Size Keyboard
- Video Port For Full-Size VGA Monitor

- 2 To 3 Hours Operation
- FastLynx Notebook-to-PC Software & Cables
- Size: 8.5" x 11" x 2"
- MS-DOS 4.01

NB/320SX Notebook Optional Features

- Matsushita or NEC Full-Size VGA Monitor
- 80387SX Math Coprocessor
- Mouse
- Internal Fax/Modem
- 3 Slot Expansion Box
- Automobile Power Adapter
- Leather Carrying Bag
- Second Battery With Charger

THAT SETS THE STANDARD THE INDUSTRY"

MAR. 1991, COMPUTER SHOPPER



This is a full 32-bit system with an Intel 386 processor running at 20MHz. So it's much faster than the slower SX. The LP 320 uses the sharpest LCD VGA super twist screen, DRAM that's expandable to 8MB and a Conner 43MB hard drive.

And, because we believe the concept of a laptop demands portability we added a built-in rechargeable battery, so you can take it anywhere.

Of course, with a laptop this good you'd expect it to be the most expensive. It's not.

While the Compaq Portable 386 and Toshiba T5200 are priced over \$8,000 each you can have the LP-320 for \$2,750!

INFO WORLD

"Bustin' Out"
Sept. 3, 1990

FREE **TRW**
On-Site Service

Recently, the editors at InfoWorld magazine compared our new portable laptop LP 320 (setup value \$3,025) to Compaq's Portable 386 (setup value \$8,997) and Toshiba's T5200 (setup value \$8,497). Here's some of what InfoWorld said:

- 1) Speed: "Dataworld's disk-intensive total was the best"
- 2) Screen: "VGA compatible screen that has a dark and bold font that is unusually sharp"
- 3) Battery: "No other system in this comparison (Compaq nor Toshiba) supports a battery"
- 4) Support: "Helpful technicians who accurately answered our questions"
- 5) Value: "The Dataworld system is a great value. This is a solid buy."

LP320 Laptop Standard Features

- Intel 386DX 32-bit 20MHz CPU
- LCD VGA Super-Twist Screen 640x480
- 1MB DRAM (upgrade to 8MB)
- Conner 43MB IDE High-Speed Hard Drive & Controller Card
- 80387 & 80287 Support
- 3.5" 1.44MB Floppy
- Sleep Mode to Conserve Battery Power
- 1 parallel, 2 serial ports
- Separate 10-Key Numeric Keypad
- 1 Expansion Slot
- AC Adapter
- Carrying Bag
- FastLynx Laptop-to-PC Software & Cables Kit

LP320 Laptop Optional Features

- Conners 120MB or 200MB Hard Drive
- Matsushita or NEC Full Size VGA Monitor
- Math Coprocessor Intel or iIT
- 20MB to 500MB External Tape Back-Up
- Mouse
- Fax/Modem or Network Card
- 5.25" External Floppy
- Automobile Lighter Adapter

LP/320 \$2,750

20MHz/LCD VGA/1MB/43MB HD

LP/325 \$3,495

25MHz/LCD VGA/1MB/43MB HD



Standard Features

- Intel 386 25MHz or 486 25MHz CPU
- 80387 & 80387 Support
- 3.5" Floppy Drive
- 1 Parallel, 2 Serial Ports
- 2 16-bit ISA Expansion Slots
- VGA Gas Plasma 640x480
- 40MB, 25ms Conner IDE Hard Drive (120MB & 200MB Drives Optional)

PORTACOMP III 386/25 \$3,150

25MHz/VGA GAS PLASMA/4MB RAM/40MB HD

WE'RE OPEN MONDAY THRU FRIDAY FROM 6AM TO 6PM
AND ON SATURDAY FROM 9AM TILL 3PM PACIFIC TIME

All DataWorld Sales Are Backed By

**30-DAY MONEY-BACK
SATISFACTION GUARANTEE**

If you're not satisfied with your purchase return it within
30 days for a full refund (excludes shipping charges)

All DataWorld Systems Are Protected

**1-YEAR WARRANTY ON PARTS & LABOR
WITH LIFETIME TOLL-FREE TECH SUPPORT**

Corporate/Government purchase orders accepted upon approved credit

1-800-736-3282

In California call (213) 695-3777

Fax: (213) 695-7016

**DATA
DATAWORLD**

3733 San Gabriel River Parkway
Pico Rivera, CA 90660-1404

**PC
MAGAZINE**

**PC
MAGAZINE**

**EDITORS'
CHOICE**

Data 386/25

**PC
MAGAZINE**

**EDITORS'
CHOICE**

Data 386/25

**PC
MAGAZINE**

**EDITORS'
CHOICE**

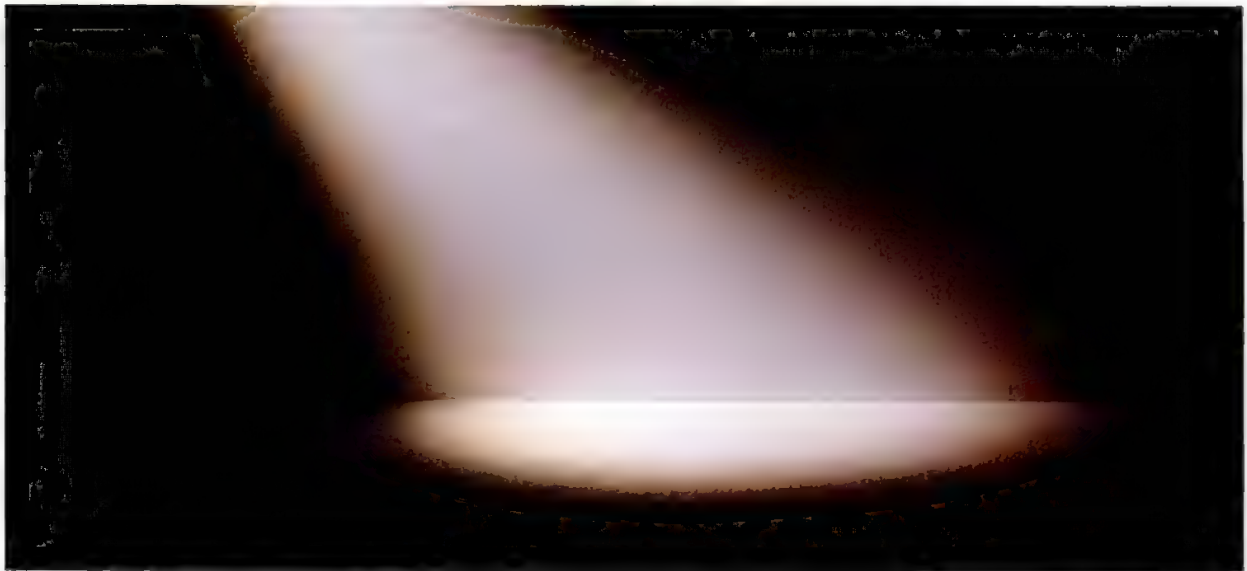
Data 386/16

**PC
MAGAZINE**

**EDITORS'
CHOICE**

Portacom III

You won't get fired for buying NEC.
You may, however, get noticed.



Introducing the PowerMate® SX/20. It gives you the power and speed of the



20MHz Intel 386™SX microprocessor. It gives you 2MB

of RAM (which can be readily expanded to 16MB).



And it gives you the storage bays and expansion slots you need

to make your system grow as your requirements do. Most important, it gives you

something you can't get from anyone else, at any price: NEC. For more infor-

PowerMate is a registered trademark of NEC Corporation. © 1991 NEC Technologies, Inc.

mation, call 1-800-NEC-INFO. The PowerMate SX/20 from NEC. Choosing

386 is a trademark of Intel Corporation.

it will gain you a certain amount of attention. All of it good.

Intel is a registered trademark of Intel Corporation.

C&C

Computers and Communications

NEC

CIRCLE 157 ON READER SERVICE CARD

Letters

begin to think about not only getting the issue to the mailbox, but also where it may end up. We as a nation are drowning in trash, and the computer industry has to share in finding solutions.

Publishing a magazine is a business venture, and you should listen to what

**We as a nation
are drowning in
trash, and the
computer industry
has to share in
finding solutions.**

consumers want. Not slick nonrecyclable magazines, but something we can feel good about reading and using again.

Lawrence Svien
Lake City, Minnesota

ME A CULPA

The November 13, 1990 printer blockbuster issue contained a mistake that I would like to bring to your readers' attention. The index of previously reviewed printers on page 455 failed to indicate that the Panasonic KX-P1124 had previously been awarded Editors' Choice. Both it and the KX-P1180 received Editors' Choice awards in 1989. Panasonic wouldn't want your readers to think that the KX-P1124 printer—the best-selling 24-pin dot matrix printer in history—had not been awarded this high honor.

Edison Peres
National Marketing Manager
Computer Printer Division
Panasonic OA
Secaucus, New Jersey

EXTEND YOUR REACH

I was pleased to see our company mentioned in Bill Machrone's "Extend Your Reach" column (January 29, 1991). As Bill notes, ACT Corp. has taken over the Powertel Carrier Controls (PCC) line from Leviton. However, Leviton has *not* gone

out of the X-10 device business. We still offer top-quality devices under the Decora Electronic Controls (DEC) name, including the keypad transmitters Bill discussed.

You should still check with your local electrical distributor. If they don't have info, you can drop a note to Leviton Manufacturing Co. at 59-25 Little Neck Pkwy., Little Neck, NY 11362-2591. Mention DEC.

Pete Falina, IE Manager
Leviton, Hills Grove Division
Warwick, Rhode Island

SHAREWARE

Many PC users need a special utility or maintenance program at some point. I suggest they investigate shareware, which has some sophisticated programs, most of which are not in the retail stores.

I found a very versatile program called *FASTSORT*. It can sort up to 32 files (any type), up to 32 fields (any type), and much more. For easy, fast, no-frills sorting, it has an EZSORT interface that is menu driven. You can get this program through shareware or by writing to DC Software, 6705 Laramie Dr., Plano, TX 75023.

Robert E. Burkett
Westland, Michigan

CORRECTIONS & AMPLIFICATIONS

In the Software category of our "7th Annual Awards for Technical Excellence" (January 15, 1991), Fox Software's phone number should have read 419-874-0162.

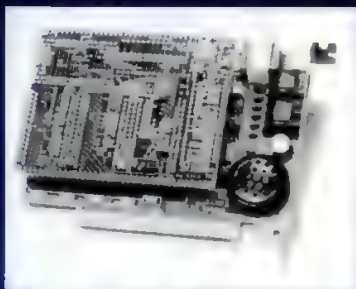
In the February 26, 1991, New and Improved column, LeTech International's phone number should have read 801-975-1776.

In the February 26, 1991, issue, "Windows Your Way: 41 Utilities for Windows 3.0," cover story, the phone number for Dariana Technologies, the makers of *WinSleuth*, is 714-994-7400.

HOW TO WRITE TO PC MAGAZINE

We welcome your comments, complaints, insights, and suggestions. Please send them to Letters, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see page 8 for access information). All letters become the property of *PC Magazine* and are subject to editing.

IBM-compatible SDLC Adapters with V.32 Modem



■ Available with CCITT V.32 or V.32bis synchronous modem in versions for ISA/EISA PCs and IBM PS/2's with MCA

■ Support PC-to-mainframe SDLC communications over dial-up phone lines at speeds up to 9600 bps or 14,400 bps

■ Packaged as half-cards; ISA versions fit in expansion slot of several popular portables; MCA versions fit in PS/2 P70, P75 short slot

■ Run IBM SNA/SDLC connectivity software under DOS and OS/2® Extended Edition Communications Manager including Personal Communications Manager/ACTA, APPC/AS, and AS/400 PC Support

■ Additional software included for DOS and OS/2 systems (optional IBM CICS and ACT/Runway)

For more information, call toll-free

(800) 444-1982

MICROGATE®
CORPORATION



9501 Capital of Texas Highway
Suite 105
P.O. Box 27350
Austin, Texas 78755-2350
(512) 345-7791

Microgate is a registered trademark of Microgate Corp.
IBM, PS/2, OS/2, and AS/400 are trademarks of IBM Corp.

Some call this mapping. why Tucson didn't meet



For your free Harvard GeoGraphics demo disk, call 1-800-336-8360, ext. 702.

Harvard is a registered trademark of Software Publishing Corporation. © 1991 Software Publishing Corporation, 1901 Landings Dr., Mountain View, CA 94039-7210.

We call it figuring out its quota.

We also call it Harvard® GeoGraphics.

It's a brand new presentation mapping program from Software Publishing Corporation.

That helps your audience get a clearer picture of what's being said. By letting you present facts and figures in a context they'll understand.

Namely, maps.

Thousands of them. Harvard GeoGraphics gives you 192 countries, 50 U.S. states, 3,141 U.S. counties and over 60,000 city locations.

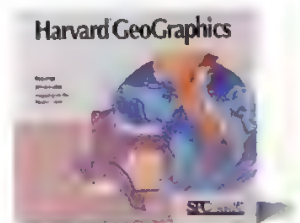
Maps you can then custom-define, like we did with our Tucson example. You can also have the program color-code each map automatically by just typing in your data. Or even link your map to a spreadsheet or database so it always reflects the latest and greatest information.

Call for your free demo disk today.

The technique is called mapping. But we think you'll call it just plain smart.



SPC SOFTWARE
PUBLISHING
CORPORATION



Make Your Accounting Clear and Simple. Crystal Accounting for Microsoft Windows 3.0



There's a Peachtree Accounting Product for Every Small Business.

Crystal Accounting™



The Clear Choice for Windows Accounting.

Includes: General Ledger, Accounts Receivable, Payrolling, Accounts Payable, Payroll and Financial Report Writer.

\$495

Peachtree Complete® III



The Biggest Value in Small-Business Accounting.

Includes: General Ledger, Accounts Receivable, Payrolling, Accounts Payable, Inventory, Purchase Order Payroll, Fixed Assets and 13 most.

Winner of the 1990 Computer Shopper Best Buy Award

\$199

Peachtree Double Bonus Bundle™



The Top Accounting Value with the Added Benefit of Custom Reporting.

Includes Peachtree Complete III Accounting modules plus Peachtree Data Query (PDQ) gives you easy access to the information in your accounting system for the purpose of creating custom reports.

\$298

Until now, innovations in accounting software have centered around a competitive war of features. Peachtree Software is breaking that barrier with a fresh new product that will forever change the way small- to medium-sized businesses view their financial picture. Crystal Accounting™ combines the power of solid accounting functionality with the visual appeal of Microsoft Windows 3.0™ to bring you a system that performs traditional tasks in a way that feels entirely new.

Why Windows Accounting? Productivity is the biggest benefit Windows brings to accounting software. Crystal Accounting uses the intuitive graphical interface and logical pull-down menu system to present accounting features that are faster to learn and easier to use, a savings that will pay off for your business now and in the future. And once you learn Crystal Accounting, you'll generally know how to use all Windows applications.

Information is more accessible in Crystal Accounting and can be displayed in multiple windows on the screen. Background processing is also a time saver. For example, you can print checks in one window while you post invoices in another.

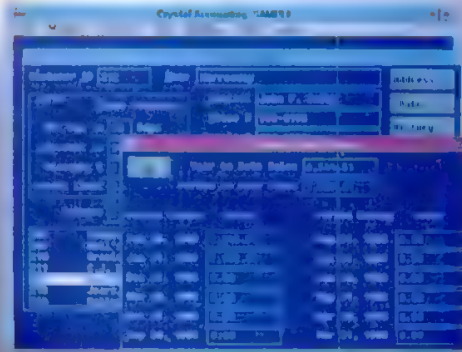
Crystal Accounting supports Dynamic Data Exchange, which permits "hot links" with other Windows applications. Information from Crystal Accounting could be included in a Windows spreadsheet. If changes are made to the accounting data, the linked spreadsheet is simultaneously updated as well.

Why Crystal Accounting?

Crystal Accounting contains six fully-integrated modules — General Ledger, Accounts Receivable, Invoicing, Accounts Payable, Payroll and Financial Report Writer. All modules are automatically updated as information is entered or changed.

Installation is particularly simple thanks to a series of step-by-step prompts and a wealth of sample accounts and transactions that can be used as models to get the system up and running quickly.

Crystal Accounting streamlines many routine functions. Recurring monthly transactions, such as invoices, vendor payments and ledger entries, can be handled automatically. "On the fly" lookups and record alterations can be done at any point within the system, which also keeps data entry time to a minimum.



Crystal Accounting modules are fully networkable and can handle an unlimited number of transactions, customers, vendors, employees, companies and cash accounts. This is an accounting program that can expand along with your business.

Generating reports with Crystal Accounting is as straightforward as a menu selection, but flexible enough to give you exactly the information you need in the format you want. You have nearly limitless options for designating the font, type size, style and overall format of reports. All reports can be reviewed on screen, from start to finish, in detail or summary format.

The Financial Report Writer further expands reporting options with an interface to General Ledger that allows you to create a variety of ways to view and print your financial statements. Crystal Accounting prints checks, W-2s, 940s, statements, invoices, cash flow statements and more.

Why Peachtree Accounting?

Crystal Accounting is priced at \$495, and when purchased from Peachtree Software, carries a 60-day money-back guarantee. A \$25 restocking fee does apply to product returns.

Peachtree also stands behind its products with a toll-free number for telephone support. As a registered Peachtree user, you may receive support on a pay-per-call basis using a major credit card or prepaid through the PeachCare™ program. Although Crystal represents an entirely new type of accounting software, you can be comfortable with the fact it is published by Peachtree Software, the leading supplier of microcomputer accounting products.

System Requirements

Crystal Accounting requires at least an IBM AT or compatible with a hard drive; 640K of memory (1 Meg is highly recommended); an EGA, VGA or Hercules Graphics Card; DOS 3.1 or greater; and Windows 3.0 or greater. A mouse is highly recommended.

Call Now to Order
or for a dealer near you.

1-800-247-3224

404-564-5800 / FAX 404-564-5888

\$495

Plus \$7.50 Shipping and Handling
(in Georgia, add applicable sales tax)

Crystal Accounting is a trademark of Peachtree Software Incorporated. All other trademarks are owned by their respective companies.

atOnce!



Macintosh Accounting
as Easy as It Gets.

Includes General Ledger, Accounts Receivable, Invoicing, Accounts Payable, and Payroll.

Winner of the MacUser Editor's Choice Award and the MacWorld World Class Award

\$395

INSIGHT EXPERT™



The Power to See Beyond the Numbers for Macintosh Users.

Includes General Ledger, Accounts Receivable, Invoicing, Accounts Payable, Inventory, and Payroll.

Winner of the MacUser Editor's Choice Award and the MacWorld World Class Award

\$695 per module



Peachtree Software®
1505 Pavilion Place, Norcross, GA 30093

CIRCLE 358 ON READER SERVICE CARD

PCM



Red Cross Virus. Ambulance randomly moves across bottom of display.



Friday 13th Virus. Alias "Black Friday." Erases programs when you try to run them.



Disk Killer Virus. Alias "Ogre." Causes unexpected formatting of your hard disk.



Stoned Virus. Alias "Hawaii." Data loss caused by damage to directory and FAT.



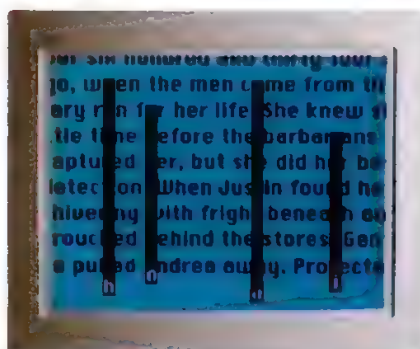
Datacrime Virus. Adds garbage to files and reformats disk.



AirCop Virus. Alias "Red State." Attacks boot sector on non-write-protected diskettes.



Ping Pong Virus. Alias "Bouncing Ball." Wipes characters off the screen.



Falling Letters Virus. Characters fall to the bottom of the monitor. Creative, but a real nuisance.



With over 50 new viruses each month, who knows what's next.

You Could Get By Without An Anti-Virus Program. Then Again, So Could These.

These days, with networks, modems, laptops, and more and more people sharing files, it's only a matter of time before a virus attacks your data.

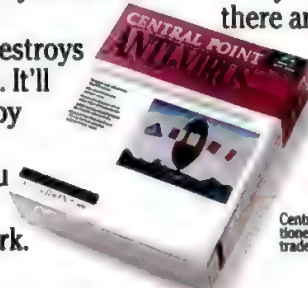
To make sure you get them before they get you, you need Central Point Anti-Virus.™ The only anti-virus program with File Immunization that protects your files so they can never be infected again.

Central Point Anti-Virus detects and destroys twice as many viruses as other programs. It'll even protect you from unknown viruses by searching for suspicious behavior.

It's the only program that protects you when you're inside Windows. The only one that works across your Novell network.

And since there are about 50 new viruses popping up every month, we give you the most comprehensive support in the business. Including a free update, quarterly mailings, a 24-hour hotline with FaxBack, and BBS and CompuServe support forums.

If you want the most complete virus protection, there are really only two things you can do. Just call 1-800-445-4076 for more information. Or unplug your computer.



Central Point Software^{INC}
Making Computing Safer, Simpler, Faster.

CIRCLE 162 ON READER SERVICE CARD

Central Point Anti-Virus is a trademark of Central Point Software Inc. Names of other products mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

by
Joe Salemi

Advisor

EPSON GRAPHICS ON A DESKJET

I have a Hewlett-Packard DeskJet Plus printer and a number of programs that use Epson LQ graphics commands. Is there any way for the DeskJet Plus to emulate an Epson LQ printer?

Kwang S. Kim
Cambridge, Massachusetts



There are a couple of solutions to this problem for owners of the original DeskJet and the DeskJet Plus. Most software vendors have updated their printer drivers to support the HP DeskJet line; contact the vendors directly to see if they have such drivers available. You'll probably need to buy a recent upgrade.

If the application in question supports the HP LaserJet family of printers, you can try using those drivers to print the graphics on your DeskJet. In the November 14, 1989, issue of *PC Magazine*, Alfred Poor reported that the DeskJet Plus responded to most LaserJet commands, so you might find these drivers sufficient for your needs.

If you absolutely must use the Epson LQ drivers, get a copy of *LaserControl* (Insight Development Corp., Emeryville, Calif.; 800-8255-4115; \$149). It's a TSR that translates the output intended for a number of printers, including the Epson MX/FX series, into codes that the DeskJet or LaserJet can use. A pop-up feature gives you complete control over the fonts and page layout, and lets you fine-tune the output. It also provides support for printing envelopes. The down side is that *LaserControl* is RAM hungry; it uses 106K, and does not support EMS memory.

An earlier version was reviewed in the March 14, 1989, issue of *PC Magazine*.

Anyone planning to buy a DeskJet will be happy to know that Epson emulation is available for the DeskJet 500; Hewlett-Packard supplies a \$79 cartridge that lets the DeskJet 500 emulate an Epson FX-80 printer.

- **EPSON GRAPHICS ON A DESKJET:** Emulating an Epson with an HP.
- **INTERRUPT CONFLICTS:** How to solve add-in card problems.
- **CONVERTING GRAPHICS:** Changing graphics files to a format you can use.

INTERRUPT CONFLICTS

I received a PM2400 MNP/Level 5 modem as a gift and have it installed on my 20-MHz Northgate 386/Elegance computer, but it does not work at all. I have installed it according to the directions and cannot make contact with anyone.

I have tried it on COM1 and COM2 without success. With COM1 settings my *PCSHELL* comes up in black and white, and with COM2 *PCSHELL* is okay but the machine hangs up when I try to log onto CompuServe. I believe the Microsoft Mouse (bus type) may be part of the problem, but I am tired of guessing what to do next.

Do you have any good suggestions to correct this problem?

Richard L. Bates
Grand Island, New York



What you describe are the classic symptoms of a hardware interrupt conflict within your PC. Hardware interrupts, or IRQs, are the way that a device signals the data bus and CPU that it needs attention. Devices that use hardware interrupts include the serial and parallel ports, mouse interface cards, game ports, and even the hard disk on XTs.

The original IBM PC and PC-XT supported only seven hardware interrupts; the AT bus extended that to 15. Until the

advent of the PS/2 Micro Channel and the EISA buses, hardware interrupts could not be shared by two or more devices within the PC. (For a complete discussion of the differences between the three bus types, see the "Bus Wars" article in the June 26, 1990, issue.)

So how does this relate to your problem? Well, there are two factors to consider. First, the majority of PC-compatible systems sold today, including most 386-based systems, are built around, and limited by, the ISA bus; every device has to have a distinct hardware interrupt.

The comm ports in the original IBM PCs, XTs, and ATs were on add-on cards, and could be set for the proper IRQ—IRQ 4 for COM1, and IRQ 3 for COM2. Over the years it became common practice among PC-compatible vendors to build the comm ports into the motherboard.

So this is the problem with your Northgate; it already has COM1 and COM2 active on the motherboard. From your description, I suspect that the card for your bus mouse, which is also a type of serial interface, is using COM2. When you set your modem to use the same IRQ, your system deadlocks trying to service three different devices at the same time. With the modem set to COM1, it interferes with the built-in COM1.

There are a couple of things you can do to solve this. First, change the IRQ it's using (it's controlled with a clearly marked jumper on the card). IRQ 5 (the interrupt for LPT2) is generally a good choice, since most systems only have one parallel port. The next step is to check the documentation for your PC, and disable one of the two built-in comm ports. Set your modem to use the same comm port as the one you turned off, and your problems should go away.

The easiest way to find this and other problems with a PC is by using diagnostic software. Utilities such as *CheckIt* (Touchstone Software Corp., Seal Beach, Calif.; 800-531-0450; \$149) and *QAPLus* (DiagSoft Inc., Scotts Valley, Calif.; 408-438-

Advisor

8247; \$139) can be used to scan your system for many different types of problems, including bad RAM chips and interrupt conflicts. If you plan on adding more boards to your PC, or if you support many different PCs as part of your job, a diagnostic package can be invaluable in helping find and solve hardware problems.

CONVERTING GRAPHICS

Are there any recent graphics conversion packages (DOS- or Windows-based) for converting graphics into various formats that can be exported to *WordPerfect* 5.1, *Ventura* 3.0, and *CorelDRAW* 1.2?

F.W. Cheung
North Point, Hong Kong



The solution for *WordPerfect* 5.0 and 5.1 is fairly easy, as the program itself directly supports importing a number of different graphics formats, such as TIFF, .PCX, .PIC, and .MSP. A number of other graphics formats can be converted to the *WordPerfect*

.WPG format through the GRAPHCVN.EXE program that is automatically copied to your WP directory when you install the program. Check your WP manual's Appendix for more details on supported formats, and on using GRAPHCVN.EXE.

Another handy utility included with *WordPerfect* is GRAB.COM. This small TSR can be used to make snapshots of text and most graphics screens, which are then saved in .WPG format for later use in a *WordPerfect* document.

The *Paintbrush* application included with *Windows* 3.0 also has some limited conversion capabilities. It can import .BMP, .MSP, or .PCX files, and save them in either .BMP or .PCX formats.

There is also a graphics conversion utility called *HiJaak* (Inset Systems Inc., Brookfield, Conn.; 800-828-8088; \$199) that comes highly recommended by many of our PC MagNet users. It supports conversions to and from .PCX, TIFF, .MSP, .GIF, .IMG, .CUT, and .WPG formats, and will also output .EPS files. As these are the most common graphics formats around today, you should be able to use *HiJaak* to convert your graphics to a format that will be supported by both the

Ventura and *CorelDRAW* programs.

HiJaak also has the ability to capture screen shots, and output them in HPCL and HGCL formats for printing on Hewlett-Packard LaserJets or plotters.

If you find that a screen capture program is all you need, but you need more than *WordPerfect*'s utility provides, the best is *Collage Plus* from Inner Media (Hollis, N.H.; 603-465-3216). It solves one of the most vexing problems in using graphics images: There are many ways to store TIFF and .PCX images including full color, black and white, gray scale, and gray scale with dithering. *Collage Plus* lets you choose among these options for either TIFF or .PCX.

ASK THE ADVISOR

Send your questions to PC Advisor, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see the instructions for joining on page 8 of this issue). Sorry, but we are cannot send personal replies.

Joe Salemi is the project manager for a federal government LAN and one of the sysops on PC MagNet.

Give Us Your Toughest Peripheral Sharing Problem

...or your simplest! Master Switch, the intelligent data switch from Rose Electronics, can handle it. The Master Switch series is so versatile and sophisticated, peripheral sharing becomes easy.

Anyone who appreciates ease-of-operation and technologically-advanced capabilities knows the Master Switch is the right choice...for sharing printers, plotters, modems, and any device with a serial or parallel port. Here's why:

- Any combination of serial or parallel ports
- Easy selection of peripherals
- User-expandable memory up to 4 megabytes
- Simultaneous access to all devices
- Rated 'fastest switch' by PC Magazine
- Advanced features include job queue, port contention, data collection, job control menu, initialization strings, pop-up menus, and many more
- Complete technical support; one-year warranty

The Low-Cost LAN Alternative
With our MasterNet software, the Master Switch provides many convenient LAN functions, such as E-mail, file transfer, and directory access.

Designed and manufactured in the USA. Field-proven in thousands of applications. The Master Switch answers any peripheral sharing challenge. Choose the intelligent data switch that handles your most complex needs, yet is easy to set up and operate... choose Master Switch.



ROSE
ELECTRONICS

(800) 333-9343

FAX (713) 933-0044 • (713) 933-7673
P.O. Box 742571 • Houston, Texas 77274
Call for complete information and our catalog of Switching and Sharing Solutions. Dealer inquiries welcome.

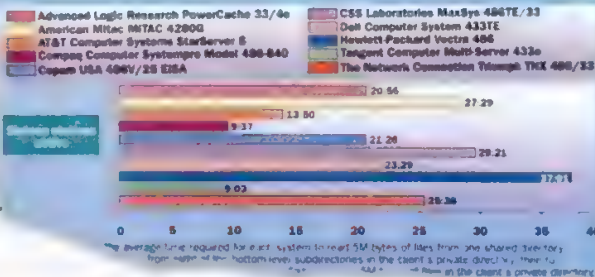
Once again, editors rave about the Tangent 486.

"...when the full 16 stations included in the test were active. The Tangent Multi-Server 433e was still the fastest..."

PC Week 1/7/91

PC WEEK

Tangent Server Maintains Performance Lead As LAN Size Increases



"A consistently strong performer across all tests, the Tangent model 433e stands out in this group." PC Magazine April 16, 1991



PC Magazine, April 16, 1991

TANGENT COMPUTER INC.

Tangent Model 433e

by Bill O'Brien

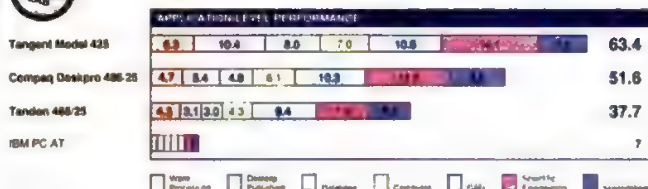
Tangent Computer's foray into the realm of the EISA bus is represented by an investment-quality machine.

"The big winner is the Tangent..."

BYTE, October, 1990

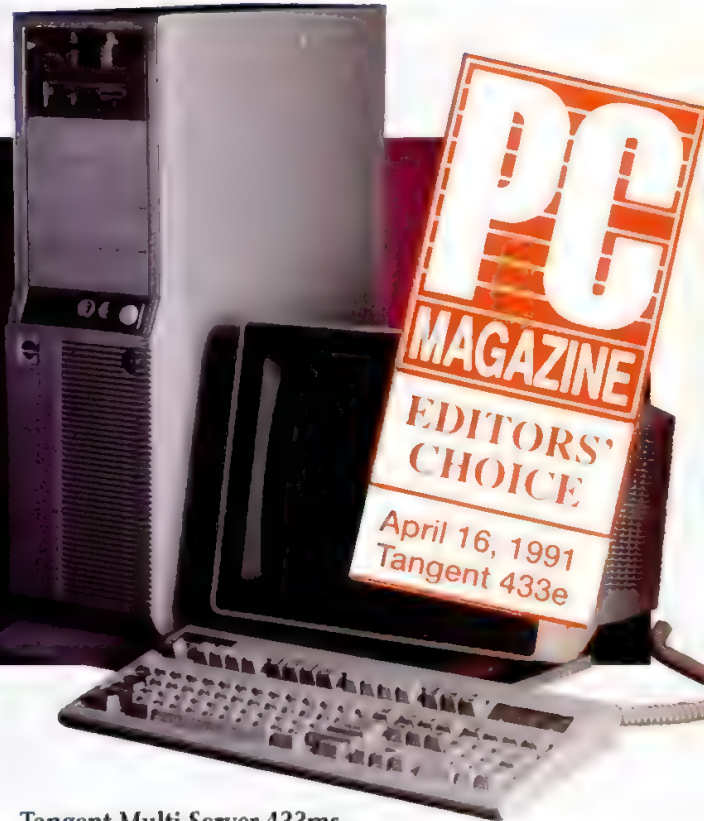


DOS BENCHMARKS



When the editors got through writing about Tangent 80486 systems, they didn't leave us a lot to say. Except price. First, compare performance. Then compare price. What you'll see is that Tangent is the price-to-performance leader in 486 systems, with a range of models designed to fit any need.

*All pricing subject to change without notice. ©1991 Tangent Computer. Tangent is a registered trademark of Tangent Computer, Inc. 486 is a registered trademark of Intel Corporation. Other product names may be the trademarks or registered trademarks of their respective companies.



Tangent Multi-Server 433ms

Capable of replacing 5 to 10 conventional servers.

- Intel 486-33 MHz EISA
- Up to 64 MB RAM
- SCSI Drive Arrays Up to 12 GB
- Continuous 1-3ms Average Access
- Up to 4 Ethernet Ports or 96 Serial Ports
- UNIX or NOVELL Configurations

Priced from \$14,900

Tangent 433e / 425e

Our high-end, award winning engineering workstation.

- Intel 486-33 or -25 MHz EISA
- 200 MB to 2.4 GB of Disk Storage
- EISA Caching 32 Bit Disk Controller
- Non-interlaced SuperVGA Monitor

Priced from \$5,995

Tangent 433i/ 425i

A 486 at a 386 price.

- Intel 486-33 or -25 MHz ISA
- 105 MB Up to 2.4 GB of Disk Storage
- Choice of IDE, ESDI or SCSI
- Non-interlaced SuperVGA Monitor

Priced from \$3,695

486 your way. Tell us your applications and operating environment and we'll configure a system to meet your needs 100%. Then we'll build, test and ship your system. Pronto.

We're here when you need us. Our sales and support engineers are as near as your telephone. . .

Tangent is your first call for affordable high performance.

Call toll free: **1-800-223-6677**



CIRCLE 391 ON READER SERVICE CARD

TANGENT
COMPUTER

197 Airport Blvd., Burlingame, CA 94010
Phone: 415/342-9388 FAX: 415/342-9380



ZEOS 386SX

**The Incredible ZEOS 386SX
Editor's Choice System.
Loaded as you like it!
Complete 16MHz ZEOS 386SX.
ONLY \$2295.
20MHz add only \$200.**

It's what everyone wants. Our Editor's Choice 386SX system loaded with features. Now Available in 20MHz! Both loaded with savings and ready to ship to you today!

- '386SX-16 CPU, 8/16MHz; or '386SX-20 CPU, 8/20MHz.
- 2MB of Zero-Wait DRAM, expandable to a System Total of 16MB.
- 85MB High Speed IDE Hard Drive.
- 1.2MB and 1.44MB Teac® floppies.
- ZEOS 14" High Res 1024x768 VGA Color Monitor with Tilt/Swivel base.
- High Speed 16-bit VGA 1024 color graphics card with 512K RAM!
- Microsoft® DOS 4.01 with Disk Cache Software *plus* Microsoft Windows™ 3.0 and mouse.
- Shadow RAM and EMS support for enhanced performance.
- ZEOS/RS 101 key SpaceSaver keyboard.
- High Speed ZEOS I/O with two Serial, one Parallel & one Game Port.
- 6-16, 2-8 bit expansion slots. 80387SX math coprocessor support.
- Rugged ZEOS SuperCase with two cooling fans for added reliability and product life.
- Seven drive bays and our custom 200 Watt power supply for your future expansion!
- Includes ZEOS 24 Hour a Day Toll Free Technical Support and Customer Satisfaction package.

Computers Now! SM

RIGHT NOW. GUARANTEED!™

Yes, we can ship your new ZEOS '386 today! We've built up an extra supply of the hottest selling computers in America—the ZEOS 386SX-16 and 20MHz *plus* the ultra-fast ZEOS 386DX-25 and 33MHz thunderbolts. Hot systems *ready now!*

Take your pick! All four of these '386 Color VGA screamers come packing a high capacity high speed hard drive, tons of memory, two floppies *plus* all the other goodies. And they're ready to ship. *Right Now!*

Here's how it works. We have these incredible ZEOS '386 Color VGA systems pre-built and ready to ship. While supplies last, we will ship any of these systems to you *the day you order* subject to these conditions:

1. Your order must be received by 1PM Central Time.
2. Credit Cards are subject to authorization.
3. Orders must be for ZEOS '386 systems configured as shown here. Any other systems or upgrades are custom built and will take slightly longer.

***OUR GUARANTEE TO YOU:**

If we accept your order for immediate shipment and fail to ship your system under the conditions outlined, we will ship it at *our expense* as soon as it is ready.

This offer is good only as long as these pre-built systems remain in stock; please give us a call to verify availability. This offer does not apply to other ZEOS systems or custom configurations.

IMMEDIATE SHIPMENT IS ONLY PART OF THE STORY.

These are not just any '386 systems. They're high performance, high quality ZEOS '386 systems. Packing all the ZEOS value that has won PC Magazine Editor's Choice—*seven times!*

But the real winner is you! Compare price, performance, quality and features. You'll see why PC Magazine selected ZEOS '386 systems "For Overall Excellence" above all others. But don't stop there.

How about *24 Hour A Day Toll Free Technical Support*. It was ZEOS who invented 24 Hour a Day Toll Free Support (it's an idea others have since copied but haven't matched). Add to it our 30 Day Absolute Satisfaction Money Back Guarantee, One Full Year Limited Warranty, Express Replacement Parts Policy and Customer Satisfaction Package. You'll love it all. Almost as much as your new system.

So give us a call right now. If we hear from you by 1:00 this afternoon, we'll get your new system on the way to you today! Call now Toll Free 800-423-5891.

Purchase orders from Fortune 1000 companies, Governments and institutions subject to approval. Leasing programs available. All prices and specifications subject to change without notice. Please call to confirm pricing, specification and warranty details. The following are trademarks of their respective corporations: Microsoft, MS DOS and Windows of Microsoft Corporation; IBM and PS/2 of IBM Corporation; ZEOS, Computers Now!, SpaceSaver, SuperCase and Z-Card of ZEOS International Ltd. © ZEOS International Ltd., 530 5th Avenue, N.W., St. Paul, MN 55112 USA. ZEOS is a publicly traded company, NASDAQ symbol: ZEOS



ZEOS 386-25

**Complete 25MHz ZEOS '386.
64K Cache, 4MB RAM, 130MB
Drive, 1024 VGA Color and
more!**

ONLY \$3195.

Power packed and ready to go! Order it UPS Red and this 25MHz Racer can be on your desk tomorrow!

- '386-25 CPU, 8/25MHz Dual Speed Keyboard Selectable.
- Ultra high speed Zero-Wait 64K SRAM Cache. Vastly superior to page/interleave memory schemes.
- 4MB of High Speed DRAM, expandable to a System Total of 16MB.
- Ultra Fast 130MB IDE Hard Drive.
- 1.2MB and 1.44MB Teac® floppy drives.
- ZEOS 14" High Res 1024x768 VGA Color Monitor with Tilt/Swivel base.
- High Speed 16-bit VGA 1024 color graphics card with 512K RAM!
- Microsoft® DOS 4.01 with Disk Cache Software *plus* Microsoft Windows™ 3.0 and mouse.
- ZEOS/RS 101 key SpaceSaver keyboard.
- High Speed ZEOS I/O Card with two Serial, one Parallel & one Game Port.
- 1-32, 6-16, 1-8 bit expansion slots. 80387 and Weitek math coprocessor support.
- Rugged ZEOS SuperCase with two cooling fans for added reliability and product life.
- Seven drive bays and our custom 300 Watt power supply for your future expansion!
- Includes ZEOS 24 Hour a Day Toll Free Technical Support and Customer Satisfaction package.



ZEOS 386-33

**Loaded ZEOS '386 33MHz
Editor's Choice Screamer.
128K Cache, 4MB RAM, 130MB
Drive, 1024 VGA Color, more.**

ONLY \$3695.

PC Magazine says, "There is very little more you can ask for from a Computer." Your 33MHz '386 Screamer in our 8-bay Vertical case!

- '386-33 CPU, 8/33MHz Dual Speed Keyboard Selectable.
- Ultra high speed Zero-Wait 128K SRAM Cache.
- 4MB of Zero-Wait DRAM, expandable to a whopping 32MB on the motherboard.
- 130MB High Speed IDE Hard Drive.
- 1.2MB and 1.44MB Teac® floppy drives.
- ZEOS 14" High Res 1024x768 VGA Color Monitor with Tilt/Swivel base.
- High Speed 16-bit VGA 1024 color graphics card with 512K RAM!
- Microsoft® DOS 4.01 with Disk Cache Software *plus* Microsoft Windows™ 3.0 and mouse.
- ZEOS/RS 101 key SpaceSaver keyboard.
- High Speed ZEOS I/O Card with two Serial, one Parallel & one Game Port.
- 2-32, 6-16 bit expansion slots. 80387 and Weitek math coprocessor support.
- Rugged ZEOS 8-bay vertical case with 250 Watt TurboCool power supply for maximum expandability.
- Two cooling fans for added reliability and increased component life.
- Includes ZEOS 24 Hour a Day Toll Free Technical Support and Customer Satisfaction package.

**ZEOS. Fast
Delivery, Great
Systems! A Few
Expert Opinions:**

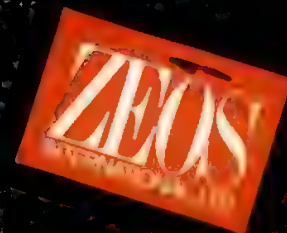
■ **PC Magazine,**
On the ZEOS
386SX, "With so
much going for it,
how could you
go wrong?"

■ **PC Magazine,**
On ZEOS '386
systems, "Out of
104 Machines...
For Overall
Excellence we
selected ZEOS
International..."

■ **PC Magazine,**
On Zeos '386
Speed, "The ZEOS
blows away every
other computer...
a smart choice."

**ORDER NOW TOLL FREE
800-423-5891**

FAX Orders: 612-633-1325
Minnesota: 612-633-4591
Hearing Impaired:
800-228-5389
Outside US and Canada:
612-633-6131
MasterCard, VISA,
Discover, Am Exp, Z-Card
and COD.
Open 24 Hours a Day,
365 Days a year!





ALR Introduces The Three Day Work Week

With the new VENTURE™-16 notebook PC from ALR, you don't have to be in the office five days a week to get all your work done. The VENTURE-16 gives you high-powered, 16-MHz, 386SX performance, so you can design your morning presentation while you ride the train to work, write a report while your car is being repaired, and set up next year's budget during the layover from Dallas to New York. With all those projects out of the way, you can begin

your weekend a little earlier. And with prices starting at just \$2795, you can begin it with more money in your pocket too.

This seven pound portable powerhouse gives you the features you'd expect to see in a full-size desktop PC, in a size that's small enough to let you work anywhere. Even the keyboard has nearly the same layout and tactile response as a desktop, so your fingers may not realize that you've left the office.

The VENTURE-16 has an 8.5" diagonal backlit screen for easy readability as well as full tilt adjustment for minimizing glare. You can clearly see your word processing documents, spreadsheets, and project planning in full VGA™ resolution.

You also have a choice of a 20- or 40-MB, light weight, fast-access hard drives to give you up to 20,000 pages of portable storage.

The Venture even comes bundled with DR DOS™, an MS-DOS™ compatible operating system that includes a host of features for optimizing your VENTURE.

And with the rechargeable battery power of the VENTURE-16, you can keep working for up to three hours. Anywhere.

Travel with the ALR VENTURE-16 into a new world of PC convenience. See your authorized ALR Power Partner reseller, or call:

1-800-444-4ALR

ALR

9401 Jeronimo Irvine, CA 92714
(714) 581-6770; FAX (714) 581-9240

	ALR VENTURE-16	COMPAQ® LTE/286™
Processor	386SX	286
Speed	16-MHz	12-MHz
RAM	1-MB	640-KB
Hard Drive	20-MB	20-MB
Display Type	VGA	CGA
	640x480	640x200
Price	\$2,795	\$3,499

Prices and configurations subject to change without notice. Prices listed on U.S. dollars. ALR is a registered trademark of Advanced Logic Research, Inc. All other brand and product names are trademarks or registered trademarks of their respective owners. © 1989 by Advanced Logic Research, Inc.

CIRCLE 165 ON READER SERVICE CARD

First Looks

Hands-on Reviews of the Latest Products

First 40-MHz 386 PC Powered By AMD, Not Intel

PREVIEW
by Christopher Barr

Bell Computer Systems, a clone maker that previously toiled in obscurity, is making a mark for itself by shipping a system with one of the new AM386DXL processors to be released by Advanced Micro Devices.

While large computer makers seem to be shying away from AMD's faster chip to preserve their ongoing relationships with Intel, the AMD processor is expected to help many small computer makers, like Bell, who've been unable to get enough of Intel's 386 processors to meet the high demand for 32-bit systems.

In addition to satisfying a part of the market that has had no alternative, AMD's 40-MHz processor pumps adrenaline into the 80386 line and repre-



PHOTOGRAPHY THOM O'CONNOR

sents the first real challenge that Intel has had in the PC market.

Some insiders expect a price war to break out. Although Advanced Micro Devices is not giving these chips away—the 40-MHz AM386DXL chip is

priced at \$306 each for lots of 100, just below the cost of Intel's 80386 33-MHz processor—Intel is expected to react with price cuts across its entire line of 386 and 486 processors.

The fact that the AM386-

DXL 40-MHz processor is pin-for-pin socket-compatible with Intel's 386DX gives systems designers a head start in implementing the AMD part but does little for the user. You can't replace your 33-MHz 386 with the faster AMD part. Processors re-

CONTINUES ON PAGE 34

ProWrite Plus Brings Low-End Word Processing Plus E-Mail to Windows

HANDS ON
by Edward Mendelson

Windows 3.0 needs a word processor more advanced than *Windows Write* and less complex than *Word for Windows* or *Ami Pro*. Software Publishing's \$249 *Professional Write Plus*, a simple yet powerful package that most *Windows* users can learn in minutes, fills that need.

As a bonus, it adds a front end for the MHS electronic mail system, a feature found in no other *Windows* word processor and, among DOS word processors, found only in packages like *MultiMate*.

ProWrite Plus gives you all the basic formatting functions you expect from a word processor: headers and footers, footnotes and endnotes, automatically balanced columns, and elaborate paragraph styles with options for lines, bullets, and special effects such as automatic bolding of the paragraph's first line. You can set the program to give you up to four Undo levels. You can attach Post-It-style notes anywhere in your text, and create DDE links to other *Windows* applications. You get a fast, smart spellchecker and a thesaurus that offers simple definitions.

You also get a half-integrated version of *Grammatik for Windows* that works only with *ProWrite Plus* files. (When you select Grammar from the menu, *ProWrite Plus* first saves your file, closes itself down, and then lets the grammar checker take over.) The program lets you create on-screen frames that can house graphics or text; graphics frames can accept imports in most standard bitmap and vector formats. You get all of this functionality at about half the price of *Word for Windows*.

ProWrite Plus won't give you advanced formatting features like automatic lists, outlining, or tables of contents. Nor will it give you conveniences like macros and split-screen views of two separate parts of a document.

But it does give you a fully

customizable display. You can edit in full-page mode or in various levels of magnification—although word spacing is sometimes strange in most reduced views. You can view facing pages, but can't edit them.

On the left of the screen is an optional icon bar with graphics symbols that you can click on and use as shortcuts to commands normally buried in pull-down menus. You can choose up to 12 from almost 50 different symbols, to create a customized toolkit for your most frequently accessed commands.

If all this reminds you of *Ami Pro*, and especially its little brother *Ami*, there's a good reason. Software Publishing bought rights to the *Ami* code from Samna Corp. before Lotus bought out Samna. In many

CONTINUES ON PAGE 35

First Looks

40-MHz 386

CONTINUED FROM PAGE 33

quire supporting chips to operate the system bus, memory access, and I/O.

The chip set for the Bell 386WB-40C was developed by OPTi of Santa Clara. Orchid Technologies is also developing a 40-MHz motherboard, and Northgate plans to ship a model based on its own 40-MHz motherboard design.

The Bell 386WB-40C we tested was a prototype system that had not yet received FCC

certification. It is a full-height small-footprint model with 8 ISA slots (two 8-bit, five 16-bit, and one 32-bit). Two memory slots are filled with a video card and a combination I/O card that can control two floppy disks and two IDE hard disks. The 200MB Conner IDE drive is mounted on top of the power supply, leaving two half-height drive bays available. The motherboard comes with 70-nanosecond DRAM, and an 80387 socket. The machine used a preliminary BIOS from Microid Research that will be modified in the production release.

The results of PC Magazine Labs testing revealed how im-

portant chip set design can be in affecting overall performance.

A 40-MHz chip operates roughly 20 percent faster than a 33-MHz chip. And in fact, the Bell 386WB-40C was 20 percent faster than a Compaq 386/33 on the PC Labs 80386 instruction mix benchmark tests. The 80386 instruction test is also a good indication of the processor's compatibility; the Bell computer passed all PC Labs compatibility tests.

But the OPTi chip set in the Bell system didn't appear to take advantage of OPTi's proprietary write-back caching scheme which, like the Deskpro 386/33, uses 64K of 25-nanosecond static RAM.

On the PC Labs conventional memory tests, which exercise the first 640K of memory, the Bell machine was as fast as, but no faster than, the Compaq Deskpro 386/33, and close to the fastest of the 33-MHz PCs that use an external SRAM cache (like the CompuAdd 333T and the Zeos 386-33).

If the system were opti-

mized, the Bell machine would have performed 20 percent faster than the 33-MHz Deskpro.

But the unit's 16-bit, 1MB proprietary video card is blazingly fast. It was based on the Tseng Laboratories 4000 video controller, and shows a performance gain because it was optimized for the 40-MHz chip.

The Bell 386WB-40C is a fast, compatible computer. The outstanding aspect is the AM386DXL 40-MHz chip, but its low cost and speedy performance make the Bell 386WB-40C a respectable showcase for this breakthrough processor.

List Price: Bell Computer 386WB-40C, with 4MB RAM, 120MB hard disk, 1.2MB and 1.44MB floppy disks, Super VGA, one parallel and two serial ports, mouse, DOS 4.01, Windows 3.0, \$2,995; with 8MB RAM, 200MB hard disk, VGA 16-bit card with 1MB RAM, \$3,675. Bell Computer Systems, 6615 Valjean Ave., Van Nuys, CA 91406; 800-922-1126, 818-909-3501.

CIRCLE 700 ON READER SERVICE CARD

CAN AMD USE INTEL CODE? THE COURTS WILL DECIDE

by Winn L. Rosch

AMD created its own design for the AM386, but one way that the company's engineers saved development time was to use Intel's microcode—the internal hard-coded program that controls the operation of a microprocessor—instead of reverse-engineering it.

AMD believes it is the only company that has the right to use Intel's microcode because of a 1975 licensing agreement between the two. According to AMD, this contract authorizes the company to use all of Intel's designs and patents through 1995. Intel believes otherwise.

Consequently the two companies are locked in several legal battles.

When AMD released its own version of Intel's 287 math coprocessor, Intel sued. That suit is still not settled.

A trademark suit regarding the use of the 386 designation has been resolved. On March 1, 1991, the term "386," which Intel had claimed as a trademark, was ruled generic, a decision that allows AMD to call its new chip the AM386.

If Intel does sue AMD over the release of the AM386—which is considered likely—it will be based on the

same principle as the battle over the 287: whether or not AMD is entitled to use Intel microcode.

Intel claims the 1975 agreement gave AMD the right to copy only Intel's microcode, not to distribute it. AMD claims that's nonsense, that the only use for microcode is inside mass-produced microchips. The trial over the 287 is expected later this year.

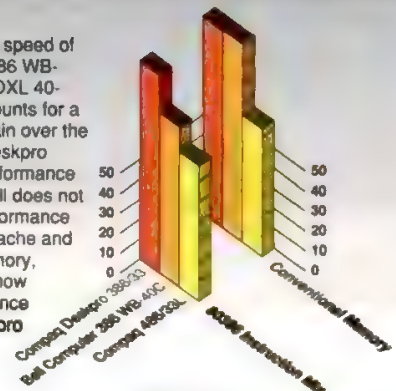
Although the 287 case will decide the essential issue in the 386 matter, Intel has good reasons for filing a separate lawsuit regarding the new chip. For example, it could ask the court to bar sales of the AM386, though since a federal judge refused to take the AMD 287 off the market in spite of the ongoing litigation, it's unlikely that such a request would be granted.

And even if AMD loses a 386 court battle, it could redesign its chip with different microcode, a strategy the company vows to adopt if necessary.

No matter the legal outcome, you've nothing to worry about if you buy a PC based on the AM386 chip. According to AMD, it would "indemnify its customers in the unlikely event that AM386 sales were barred."

BENCHMARK TESTS: BELL COMPUTER 386 WB-40C

The faster operating speed of the Bell Computer 386 WB-40C with its AM386DXL 40-MHz processor accounts for a 20 percent speed gain over the 33-MHz Compaq Deskpro 386/33. Memory performance is unspectacular. Bell does not achieve optimal performance from its write back cache and 70 nanosecond memory, which also should show 20 percent performance gains over the Deskpro 386/33.



Relative Times
(Compaq Deskpro 386/33 = 100)

The 80386 Instruction Mix benchmark test times a series of tasks specific to the 80386 chip. This test shows how the CPU operates in the context of the bus, processor, system memory, and motherboard architecture.

The Conventional Memory benchmark test measures the read/write speed of the first 640K of memory. Slower times can indicate the presence of memory wait states or memory chips rated at slower access speeds.

Performance Times (Times given in seconds)	80386 Instruction Mix	Conventional Memory
Compaq Deskpro 386/33	1.13	0.25
Bell Computer 386 WB-40C	1.34	0.25
Compaq 486/33L	1.13	0.16

INTEL COMPATIBILITY? IT'S JUST THE BEGINNING OF THE STORY

by Robert W. Kane

AMD has gone to great lengths to insure that its new AM386 chip is fully compatible with Intel's 80386 chip, but that's only a part of the story. There are some real differences between the two chips, differences that AMD hopes are enticing enough to lure customers away from Intel.

The most obvious difference is in the maximum speed of operation. As of this writing, the maximum operating speed available for the Intel 386 chip is 33 MHz; AMD's 40-MHz version is 21 percent faster. A not-so-obvious dif-

ference is that unlike the Intel 386 chip, the AMD boasts a true static design.

In a static design, there is no minimum operating speed. The AMD chip can be clocked from its maximum operating frequency all the way down to 0 MHz. The beneficiaries of the design are battery-powered laptop and portable computers, since reducing the processor speed reduces power consumption.

AMD isn't alone. Intel's recently introduced 386SL also uses a static design.

AMD's packaging of the processor will also help portability.

All Intel 386DX parts come packaged in a pin grid array (PGA). The PGA has all the pins for the microprocessor sticking out of the bottom of the chip so it can be popped into a socket.

There are clearly two disadvantages linked with this design: The processor occupies considerable space, and adequate airflow is required to keep the part cool.

The AM386 is available in both PGA and plastic quad flat package (PQFP). The PQFP's surface-mount design takes up 40 percent less space than the PGA package. And according

to AMD's preliminary information, the package should offer an operating temperature 15 degrees Celsius higher than the PGA package, obviating the need for a cooling fan.

In testing, we found AMD's claims of register compatibility to be justified, but AMD does not claim to have matched every processor state of Intel's part. In fact, we did encounter a system board designed for an early version of the Intel 386 that had problems with the AM386 chip. But this level of compatibility should concern only systems designers, not users.

ProWrite Plus

CONTINUED FROM PAGE 33

ways *ProWrite Plus* is an improved version of the low-end *Ami*—and, despite the similarity of names, *ProWrite Plus* doesn't resemble at all the DOS version of SPC's *Professional Write* (although it can import its files).

Compared with *Ami*, *ProWrite Plus* has clearer, more explicit menus, added or improved import/export filters (although they're still far from perfect), new features like improved screen fonts and built-in e-mail. Software Publishing claims to have optimized the code as well.

But most of the faults of the original *Ami* still haunt *ProWrite Plus*. You still can't search for two carriage returns. There's still no *WinWord*-like key that lets you extend the blocked selection in a document without keeping your finger on the shift key. Mail-merge is still primitive and you still can't see the top and bottom of a page at the same time.

When you switch into draft mode you still can't see the text if it is inside a frame, unless the cursor was in the frame when you switched—in which case you can't see the text outside the frame. And if you want to open a second file, you have to open a

RAM-wasting second copy of *ProWrite Plus*. Surprisingly, some of the best features of *Ami* have disappeared. The program lacks *Ami*'s built-in macros that could be attached to function keys and even installed on the icon bar for a more customized screen than you can get in *ProWrite Plus*.

On-line Help is more extensive in *ProWrite Plus* than it was in *Ami*—Software Publishing claims to have included half the manual—but you can't access it from many submenus where you're likely to need it. Surprisingly, for a program de-

signed for ease of use, you run the install program from the DOS prompt, and you have to add an icon to Program Manager manually when you're through.

The one feature that most differentiates *ProWrite Plus* from its competition is its built-in e-mail. Simply by choosing E-Mail from the menu bar you can send all, or a marked section, of a document over any MHS message system. Other menu choices let you decide whether to send paragraph styles as well as the document itself. The program can also re-

ceive incoming mail and maintain a log of all messages.

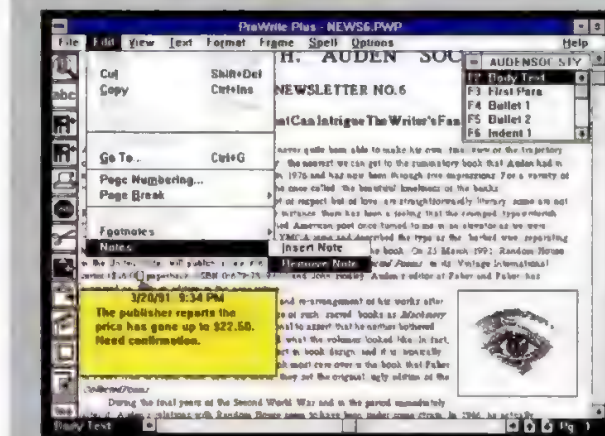
This well-integrated coupling of word processing and e-mail (far better implemented than in *MultiMate*) is a brilliant innovation that was long overdue. For the end user, *ProWrite Plus*'s e-mail is flawlessly simple to operate.

But to get the feature up and running, your network's system administrator must first set up MHS to use *ProWrite Plus* as your LAN e-mail system.

Professional Write Plus isn't the only executive-class *Windows* word processor you'll be able to choose from in the near future. Symantec's *Just Write* is due within weeks, and, at a more advanced and more expensive level, you'll be able to choose between *DeScribe for Windows* or *WordPerfect for Windows* in a few months. Meanwhile, despite its minor flaws, *ProWrite Plus* is the program to choose if you want *Windows* word processing that's less intimidating or expensive than *WinWord* or *Ami Pro*. ■

List Price: *Professional Write Plus*, \$249. **Requires:** 1MB RAM, DOS 3.0 or later, *Windows* 3.0. Software Publishing Corp., 1901 Landings Dr., P.O. Box 7210, Mountain View, CA 94039-7210; 415-962-8910.

CIRCLE 710 ON READER SERVICE CARD



Professional Write Plus lets you attach notes to your text. They normally appear as small boxes on-screen.

First Looks

IBM Kicks Off Laptop Line

HANDS ON
by Mitt Jones

Five years after unveiling the PC Convertible—its first laptop and one of its most prodigious failures—IBM has reentered the laptop market with a 386SX-based clamshell portable intended in part as a desktop replacement.

IBM promises that the 7.8-pound PS/2 Model L40 SX is only the first of what will be an aggressive line of laptop offerings, including at least one notebook model. Meanwhile, the L40's spacious keyboard and relatively aggressive pricing make it a machine worth considering, despite a few quite serious faults.

Judged by its feature list alone, the L40 compares favorably to any competition. The \$5,995 list price excludes DOS, but its standard features include: 2MB dynamic RAM expandable to a whopping 18MB, a 2.5-inch Conner Peripherals 60MB hard disk, a 10-inch backlit VGA LCD capable of 32 gray scales, a 1.44MB floppy

disk drive, and a 17-key external numeric keypad. The removable nickel cadmium battery pack carries a 3-hour rating, and standard ports include one serial, one parallel, and one external VGA. A built-in mini-DIN connector connects the external numeric keypad or a mouse, and the keypad itself contains a mini-DIN connector for a mouse.

Of course, IBM built in a resume mode—a feature it pioneered with the PC Convertible. It also includes a secondary rechargeable battery that maintains RAM in sleep mode for as long as 20 minutes during battery changes. An 80387SX math coprocessor, internal fax/data modem, and quick-charge rate are among the more interesting system options.

The L40 measures 2.1 by 12.75 by 10.6 (HWD) inches, thin enough to deserve the notebook moniker, but a bit wide and deep.

The keyboard action either wins people over or incites the opposite reaction—it's clicky, bouncy, and a bit loose. But the layout wins consistent praise. IBM made a few concessions to fit the 84 keys into a reasonably small space, but held firm to a cursor-key and page-control layout close to that of the 101-key keyboard. The keyboard is built on a 5-degree incline, giving it a comfortable feel.

The drawbacks of the L40 begin with its LCD—a side-lit supertwist screen supplied by Toshiba. Configured in its default page-white mode, the display suffers badly from blotching and ghosting. The background is smoother when the display is set to white on black, but ghosting is still a significant distraction. When you toggle between the two modes you are forced back to the DOS prompt or to the ROM-based setup program.

IBM did an excellent job of mapping the 32 gray scales of the display to color. But this bit of adept design does little to

compensate for the display's shortcomings.

Two other weaknesses of the machine lie with the sluggish resume feature—the L40 needs about 25 seconds for a transition from sleep to active states—and the L40's battery capabilities. The standard A/C adapter requires about 10 hours to fully charge the battery, and the battery itself powers the machine for a good bit less than IBM's 3-hour rating. The L40 ran for only 1 hour and 34 minutes on the PC Magazine Labs rundown test, which measures battery life under a worst-case scenario (ports and components enabled; battery conservation features disabled). With the fax/data modem disabled, the machine ran for 2 hours and 11 minutes.

The L40 has an unusual bank of LCD indicators. Ten small LCDs line up far above the key-

board, giving the machine a space-age look. Most of the indicators handle the usual tasks, such as indicating disk activity and key-lock status. A battery status LCD shows whether the battery is at a high, medium, or low charge.

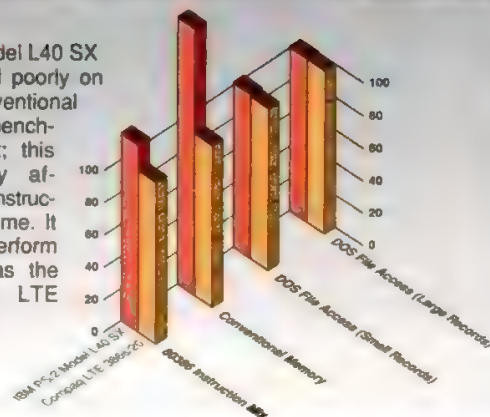
Another notable feature is the expansion-chassis connector: The connector, for which there is as yet no chassis, utilizes the AT-bus specification, not MCA.

The IBM PS/2 Model L40 SX is a potentially fine laptop that isn't quite there yet. Its primary strengths are its keyboard, its substantial list of features and options, and its solid construction. Its most serious drawback—the marginal quality of its VGA LCD—warrants a serious note of caution. Don't buy until you get a firsthand look at what you'll have to live with. ■



BENCHMARK TESTS: IBM PS/2 MODEL L40 SX

IBM's Model L40 SX performed poorly on the Conventional Memory benchmark test; this negatively affected its Instruction Mix time. It failed to perform as well as the Compaq LTE 386s/20.



The 80386 Instruction Mix benchmark test times a series of tasks specific to the 80386 chip. This test shows how the CPU operates in the context of the bus, processor, system memory, and motherboard architecture.

The Conventional Memory benchmark test measures the read/write speed of the first 640K of memory. Slower times can indicate the presence of memory wait states or memory chips rated at slower access speeds.

Relative Times
(Compaq LTE 386s/20 = 100)

The DOS File Access (Small and Large Records) benchmark tests time disk throughput as a result of mechanical disk drive speed, hard disk controller function, and bus speed. These tests are performed without software disk caching. The large-record segment of the test minimizes the effect of small hardware caches on disk subsystem performance.

Performance Times (Times given in seconds)	80386 Instruc- tion Mix	Conven- tional Memory	DOS File Access (Small Records)	DOS File Access (Large Records)
IBM PS/2 Model L40 SX	3.59	0.74	61.65	5.94
Compaq LTE 386s/20	3.09	0.45	60.60	5.89



FACT FILE

IBM PS/2 Model L40 SX
IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; 914-642-4662.
List Price: With 2MB RAM, 60MB hard disk, 1.44MB floppy disk drive, 10-inch VGA LCD, external numeric keypad, carrying case, I/O ports, \$5,995. Internal data/fax modem, \$659; 2MB memory module, \$849; 4MB memory module, \$1,995; 8MB memory module, \$3,595; spare battery pack, \$129; quick charger, \$219; car battery adapter, \$249; deluxe carrying case, \$199; travel case with wheels, handle, \$369.
In Short: Despite its mediocre VGA LCD, the PS/2 Model L40 SX deserves note for its excellent keyboard layout and its impressive assortment of standard features.

CIRCLE 707 ON READER SERVICE CARD

You get **5** fonts with the Starter Kit **PLUS A FREE BONUS!**

Text Fonts

- | | |
|---|---|
| ☐ Avant Guard | ☐ Gibraltar |
| ☐ Baskerton | ☐ Jewel |
| ☐ Capelli | ☐ Joulliard |
| ☐ Century | ☐ Katrina |
| ☒ Corporate | ☐ Letter Gothic |
| ☐ Corporate Condensed | ☐ Obelisk |
| ☐ Courier | ☐ Oxford |
| ☐ Eterna | ☐ Padua |
| ☐ Futuri | ☐ Prestige |
| ☐ Garamand | ☒ Roman |
| ☐ Garamand Condensed | ☐ Souvienne |
| ☐ Gazette | ☐ Top Hat |

Decorative Fonts

- | | |
|--|--|
| ☐ Aero | ☐ Gettysburg |
| ☐ Army Black | ☐ Greek AB \$f 01 |
| ☐ Bongo Black | ☐ Guthrie |
| ☐ Buckingham | ☐ Harem |
| ☐ Circus | ☐ Manuscript |
| ☐ Classic Typewriter | ☐ New York Deco |
| ☐ Copperfield | ☐ Nuts |
| ☐ Coronation Script | ☐ PENWIN |
| ☐ Dateline | ☒ Rockland |
| ☐ Dateline Condensed | ☐ University Ornate |
| ☐ Diner Script | ☐ Waldorf Script |
| ☐ Don Casual | ☒ Zingbats  |
| ☒ Exchequer Script | |

Glyphix fonts work with WordPerfect 5.0/5.1, unlike any other fonts on the market. They're simple to install and simple to use and right now we're running a special, so there couldn't be a better time to try Glyphix.

Your WordPerfect Fonts menu (Ctrl-F8) will come alive. You'll be able to select a font in any size from 3 to 120 point, and choose from effects like bold, italic, bold italic, reverse, outline or shadowed text. And each font is available in both portrait and landscape and includes a complete international character set. But here's the best news. Glyphix fonts are generated *on-the-fly*, in seconds, when you print. You don't have to do anything... just sit back and admire the results.

The Glyphix Starter Kit includes our unique font management software and the fonts checked above. And everything you need to get started is in the box. No additional printer memory or upgrade is required. If you have a standard LaserJet Plus, II, IIP or III you're in business. And DeskJet owners can use Glyphix too, with our DeskJet version. Once you have our Starter Kit you can buy additional fonts at our everyday low prices. (Text fonts- \$49.95, Decorative fonts- \$24.95)

There's nothing in this fine print that changes our offer or dilutes our guarantee. If you are in anyway dissatisfied with Glyphix performance or quality return the software within 30 days and we'll refund your money. It's really that simple. To use Glyphix you need an IBM PC, AT, XT, PS/2 or compatible with a minimum of 512Kb RAM, a hard disk, MS-DOS 3.0 or later, a LaserJet Plus, Series II, IIP, III or compatible printer with 512 Kb of printer memory or a DeskJet. WordPerfect is a trademark of WordPerfect Corporation. SWFTE, Glyphix and the font names used in this advertisement are trademarks and or trademarks of SWFTE International Ltd.

WordPerfect Font Special

FREE BONUS

Order your Glyphix Starter Kit today and pick any font from the Glyphix collection as a **FREE BONUS!**

We're so sure you'll love Glyphix that we offer a 30-day money back guarantee. You risk nothing. If you're not completely satisfied return the software within 30 days for a full refund.

Call today and let us know the size disk you need, if you're a LaserJet or DeskJet user and your free font.

CALL TOLL-FREE.

800-237-9383



Glyphix Starter Kit (\$99.95 plus \$7 S&H for Federal Express)

Includes installation software for WordPerfect 5.0/5.1 and Roman, Corporate, Rockland, Exchequer Script and Zingbats fonts.

CIRCLE 299 ON READER SERVICE CARD

SWFTE International, Ltd
Stone Mill Office Park
724 Yorklyn Road
Hockessin, DE 19707
In Delaware 302-234-1740
FAX Orders 302-234-1760

Swift

First Looks

Turbo Pascal for Windows: Top Notch Language Now Builds Windows App

HANDS ON
by Barry Swann

In November of 1983, a then unknown company named Borland introduced Turbo Pascal 1.0 at \$49.95. The impact of that release was enormous; the price barrier that had previously prevented the casual user from getting into serious programming was now broken. Turbo Pascal's integrated environment began a trend; its speed became legendary. With over two million users, Turbo Pascal remains the most popular compiler ever.

In its own way, Borland's new \$249.95 Turbo Pascal for Windows (TPWin) is equally revolutionary. Previously, the standard approach to Windows programming had been to use the rather expensive combination of Microsoft C and the Microsoft Windows SDK. The duo's list price is about \$1,000; street price is around \$700. TPWin lets you build Windows applications with no additional software save Windows itself. The new program also includes object-oriented programming

(OOP). With a likely street price of \$160 and a special price of \$99.95 for the current owners of any Borland language product, Borland is hell-bent on bringing Windows programming to the masses.

Borland's recently introduced Borland C++ (First Looks, April 30, 1991) also allows Windows programming without the SDK. Like BC++, TPWin includes the Whitewater Group's *Resource Toolkit*, which offers graphical tools for creating Windows elements. But TPWin goes beyond C++ in two important ways: Unlike C++, its integrated development environment (IDE) runs under Windows, and unlike C++, it includes a rich class library called Object Windows Library (OWL).

TPWin's IDE is a Windows application. At its core is an editor that allows multiple windows in the standard Windows MDI interface. The editor includes multilevel Undo and a limited macro language. In true Turbo Pascal fashion, you can compile or debug from IDE menu choices. A compile error

causes the cursor to go to the place in the file where the syntax error occurs. For those who prefer it, a DOS command line-driven compiler is also available.

The Debugger (which can also be run as a separate application) is a version of the celebrated Turbo Debugger, with a full array of breakpoints, watches, and other debugging tools. The new version adds OOP-specific elements such as an object hierarchy view and Windows-specific tools such as message watching and the ability to have messages trigger breakpoints.

While the debugger is a Windows application, it is more awkward than other Win apps. To begin with, it runs full screen, and in text mode. Secondly, while you can switch to the running program or look at the Windows screen, you cannot switch to another application, even in 386 Enhanced mode.

All Windows programs can contain resources—binary representations of graphical user interface objects without textual source code. Resources include icons, dialog boxes, menus, cursors, bitmaps, keyboard accelerators, and strings. In addition to providing the advantage of direct manipulation of graphical objects, separating resources into a different file provides easier customization of programs—for example, translation into a foreign language. Moreover, Windows only loads in resources from an executable as needed, so resource use improves memory management.

TPWin provides two methods for dealing with resources, both licensed from third parties. The Whitewater *Resource Toolkit*, which runs as a Win app, is a lovely set of graphical tools that allows editing of each editable resource type. The editors allow manipulation of compiled resources (.RES files), as well as the native file formats for individual files such as resource scripts (.RC) for menus, or .BMPs for bitmaps. A DOS-level resource compiler, licensed from Microsoft, allows alternate compilation of resource scripts.

Many Pascal programmers haven't absorbed the OOP



FACT FILE

Turbo Pascal for Windows, Version 1.0
Borland International, 1800 Green Hills Rd., Scotts Valley, CA 95066; 408-438-8400.
List Price: \$249.95; special price for owners of any Borland language product, \$99.95.
Requires: Microsoft Windows 3.0.
In Short: Pascal comes to Windows with elegance and completeness, and without the need for the Windows SDK. This fantastic package includes a Windows-based development environment, a resource editor/compiler and a debugger.

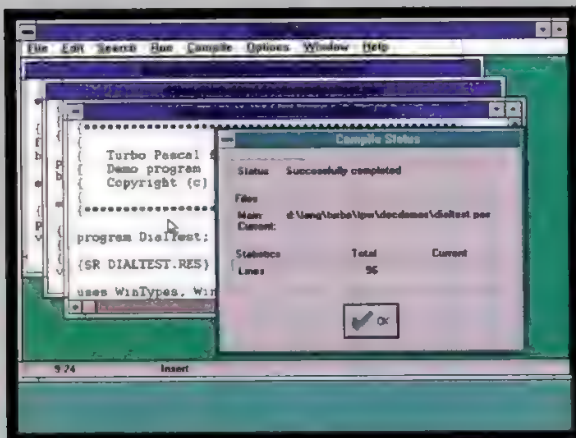
CIRCLE 701 ON READER SERVICE CARD

available in Turbo Pascal 5.5 and 6.0. By using the TPWin runtime library with WinCRT replacing TPDOS's CRT module, you could continue to write procedural programs that run in a window, but look and feel like DOS apps. To go beyond that, you'll need to learn OOP and make use of OWL. OWL's object orientation is so extensive that your application itself becomes an object. The OWL class library includes dialog boxes, an MDI interface, and multiline edit controls.

Finally, TPWin provides the programmer access to the full Windows API. TPWin programs can make calls to dynamic link libraries (DLLs), and you can even write DLLs in TPWin. The six-volume documentation included with the package is complete and well written, especially in dealing with the complete Windows API, DDE, resources, and other basics of Windows programming.

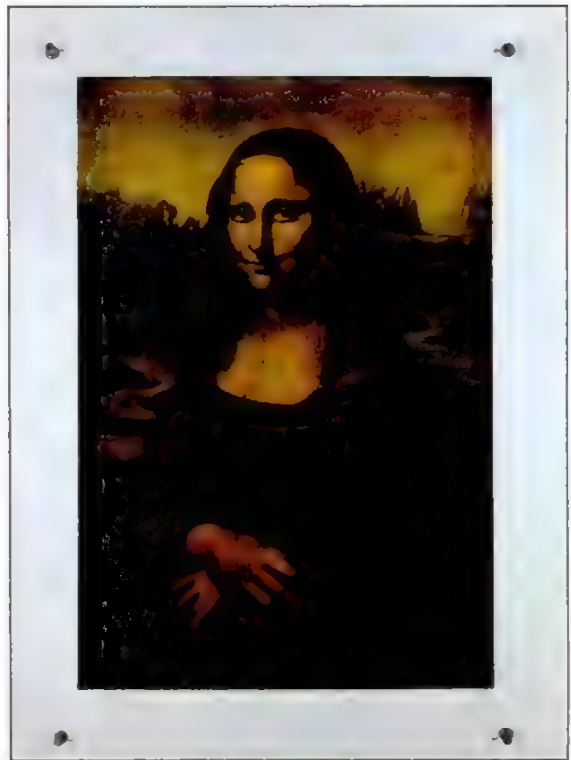
TPWin is for Windows programming only; DOS programmers will need Turbo Pascal 6.0. But the basic languages are compatible, so that source code for functions like string handling can be translated, although precompiled TPUs (Turbo Pascal Units) cannot.

In sum, TPWin means great things for programmers. Borland succeeds in making a popular language available at a popular price, for development in a popular environment. ■



TPWin's development environment is a Windows application, which makes good use of dialog boxes and multiple windows.

Get the real thing for the price of a reproduction.



True PostScript® printing for only \$1,999*: microLaser™ PS17 from Texas Instruments.

Now you can afford the powerful font and graphics capabilities of the industry-standard PostScript software from Adobe®.

The microLaser PS17 features true Adobe PostScript printing so you don't have to settle for an imitation that costs about the same, but gives you less. Plus, microLaser offers these other advantages:
17 Scalable fonts. Plenty to get you started. If you need more, choose the microLaser PS35 model, with 35 PostScript fonts. Both PS17 and PS35 models feature the new Adobe ATM™ font rendering technology, which improves the quality of PostScript fonts and prints them significantly faster.

The industry standard. With microLaser and PostScript, you can access more than 600 high-quality typefaces and over 4,000 software applications. It's also compatible with the HP LaserJet® Series II and allows you to switch between the HP and PostScript modes easily. Plus, you can connect microLaser to your PC, Macintosh® or virtually any type of



computer hardware.

Superior paper handling.

microLaser's paper drawer holds 250 sheets — and it conveniently slides inside the printer to save space. An optional, second 250-sheet paper drawer and envelope feeder are available for extra versatility.

The smallest footprint you'll find. At only 13.4" wide and 14.2" deep, microLaser offers what BYTE magazine calls, "an exquisitely small footprint and a

compact design, destined for a cramped desktop."***

If you're not ready for PostScript yet, you can buy the standard microLaser for \$1,449*. Then as your needs grow, so do microLaser's capabilities — without tools or technicians. Just add upgrade boards for PostScript software, more memory and optional interfaces. Or plug in microCartridges for additional fonts and emulations.

With all of this capability, why settle for less than the microLaser with PostScript?

Call us for additional information and the name of a dealer near you.

1-800-527-3500.


**TEXAS
INSTRUMENTS**

Spoil Yourself

With The Best Price/Performance Ratios In The Industry!!!

We know *"there is a difference"* between building computers from mediocre, acceptable components and building them from the highest quality components available. You'll see this difference in systems built to last for the long term, not just long enough for the warranty to run out. From monitors designed to reduce the strain on your eyes to hard drives built to last for three times the industry average. We believe the product we sell should be more than just nearly right, it should be exactly right, and it is! Exactly right in every aspect, including the price you'll pay. In fact, you won't find a computer with a better price/performance ratio anywhere. And whether you buy one or one hundred computers from us, we guarantee you'll be happy with Ultra-Comp. If you're not, return your system within 30 days and we'll refund your purchase price. Every system sold on these pages includes one year of On-Site service.

☒ One Year On-Site Service

☒ Toll Free Lifetime Technical Support

☒ 30 Day Money Back Guarantee

☒ Commercial Leasing Available



System shown with optional vertical case.

You Won't Find A More Spectacular Video Anywhere. Ultra-Power systems feature non-interlaced Sony 1304 monitors. The difference between interlacing and non-interlacing is like night and day. Non-interlaced monitors provide a crisp, high resolution image free of flickering and shadow ghosting. We've always known the Sony 1304 is the finest monitor available and now PC Magazine agrees, awarding it the prestigious Editor's Choice award. The Sony 1304 features a .25 dot pitch. It's paired with a 16 Bit VGA card with 1 MB RAM. The image you see will be sharper, brighter and more colorful than those produced by conventional displays.

Outstanding Disk Performance. Superior Maxtor IDE Hard Drives with the fastest access times around. These drives are built to provide exceptional durability, their lifespan is three times the industry average.

All The Memory You'll Need. 4MB, enough to run the most memory hungry software. And a 64K Static RAM Cache on the 486-33, 486-25, 386-33 and 386-25 (\$2,995).

Microsoft Mouse and Windows: a Winning Team. All Ultra-Power systems now include the easy to use Microsoft Windows 3.0 with 630 page manual and software, and the Mouse that outperforms all the others. And your choice of either MS-DOS 3.3 or 4.01.

Teac Floppy Drives. Ultra-Power systems include two Teac floppy drives: both a 5.25" (1.2MB) and a 3.5" (1.44MB). The Teac name is known around the world for quality and dependability.

World Class Keyboard. The Ultra-Click 101 key keyboard, recognized for its superior touch and exceptional on-the-job reliability.

Ultra Warranty with On-Site Service. All Ultra-Power and SX Appeal systems include a one year parts and labor warranty with On-Site service.

"There is a difference"

ULTRA-COMP

ULTRA-MAX 486-33 EISA**\$5695**

- 64K 25NS Static RAM Cache
- 4MB RAM
- 200MB 15MS IDE Hard Drive w/32K Cache
- SONY Trinitron 1024x768 Super VGA Monitor
- 16 Bit VGA Card w/ 1MB RAM
- 1.2MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- Microsoft Mouse & Windows 3.0
- MS-DOS 4.01 or 3.3
- Ultra-Click 101 Key Keyboard
- 1 Parallel & 2 Serial Ports
- One Year On-Site Service†

*Lease for as low as \$225 per month****ULTRA-MAX 486-25****\$4295**

- 64K 25NS Static RAM Cache
- 4MB RAM
- 200MB 15MS IDE Hard Drive w/32K Cache
- SONY Trinitron 1024x768 Super VGA Monitor
- 16 Bit VGA Card w/ 1MB RAM
- 1.2MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- Microsoft Mouse & Windows 3.0
- MS-DOS 4.01 or 3.3
- Ultra-Click 101 Key Keyboard
- 1 Parallel & 2 Serial Ports
- One Year On-Site Service†
- Upgrade to 33MHz CPU, add \$300

*Lease for as low as \$170 per month****ULTRA-MAX 386-33****\$3495**

- 64K 25NS Static RAM Cache
- 4MB RAM
- 200MB 15MS IDE Hard Drive w/32K Cache
- SONY Trinitron 1024x768 Super VGA Monitor
- 16 Bit VGA Card w/ 1MB RAM
- 1.2MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- Microsoft Mouse & Windows 3.0
- MS-DOS 4.01 or 3.3
- Ultra-Click 101 Key Keyboard
- 1 Parallel & 2 Serial Ports
- One Year On-Site Service†

*Lease for as low as \$138 per month****ULTRA 386-25****\$2995**

- 64K 25NS Static RAM Cache
- 4MB RAM
- 130MB 15MS IDE Hard Drive w/64K Cache
- SONY Trinitron 1024x768 Super VGA Monitor
- 16 Bit VGA Card w/ 1MB RAM
- 1.2MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- Microsoft Mouse & Windows 3.0
- MS-DOS 4.01 or 3.3
- Ultra-Click 101 Key Keyboard
- 1 Parallel & 2 Serial Ports
- One Year On-Site Service†

*Lease for as low as \$118 per month****ULTRA 386-25****\$2795**

- 4MB RAM
- 80MB 17MS IDE Hard Drive w/32K Cache
- SONY Trinitron 1024x768 Super VGA Monitor
- 16 Bit VGA Card w/ 1MB RAM
- 1.2MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- Microsoft Mouse & Windows 3.0
- MS-DOS 4.01 or 3.3
- Ultra-Click 101 Key Keyboard
- 1 Parallel & 2 Serial Ports
- One Year On-Site Service†

*Lease for as low as \$111 per month****ULTRA 386SX-16****\$2195**

- 4MB RAM
- 40MB 17MS IDE Hard Drive w/32K Cache
- SONY Trinitron 1024x768 Super VGA Monitor
- 16 Bit VGA Card w/ 1MB RAM
- 1.2MB 5.25" Floppy Drive
- 1.44MB 3.5" Floppy Drive
- Microsoft Mouse & Windows 3.0
- MS-DOS 4.01 or 3.3
- Ultra-Click 101 Key Keyboard
- 1 Parallel & 2 Serial Ports
- One Year On-Site Service†
- Upgrade to 20MHz SX, add \$150

*Lease for as low as \$87 per month**

Options. Mini and Baby AT case options available for 386 systems. Upgrade any system to a vertical case for an additional cost of \$150, for Monochrome VGA deduct \$500. If you don't see the particular system configuration you're looking for, call for custom configuration pricing. Other options include hard drives from 40MB all the way up to 1.2 gigabytes, uninterruptable power supplies, tape backups and laser printers. Commercial leasing and extended warranties are also available.

ULTRA-COMP. 11988 Dorsett Road, Maryland Heights, Missouri 63043. Call toll free 1-800-437-1988, in Missouri call 314-991-1988, fax 314-991-0437. MasterCard, VISA, Discover Card, personal and company checks accepted. Minimum order \$25. Customer freight and handling FOB St. Louis, Mo. Non credit card orders shipped UPS COD. Prices and specifications subject to change. Toll free technical support for customers outside of Missouri. Some systems photographed with optional extras. *Commercial lease only, payments based on 36 month open-end lease. †Within 50 miles of TRW service center.

Ultra-Comp is a registered trademark and Ultra-Power and SX Appeal are trademarks of Ultra-Comp. AT is a registered trademark of International Business Machines. Microsoft and MS-DOS are registered trademarks, and Windows is a trademark of Microsoft corporation. 386, 486 and SX are trademarks of Intel Corp. PC Magazine is a registered trademark of Ziff Communications Co. All other trademarks are registered trademarks of their respective owners. Not responsible for errors in typography.

Call Toll Free

1-800-437-1988

In Missouri Call 314-991-1988



First Looks

Microsoft Turns Mouse Over for Travel; Mouse Systems Shaves Inches

BallPoint Mouse

HANDS ON
by Jonathan Minkov

Today's powerful laptops are quite capable of running graphical environments like *Windows* 3.0. But using *Windows* on the go introduces yet another laptop hardware requirement: a pointing device. The Microsoft BallPoint Mouse is an intriguing attempt to adapt everyone's favorite brand-name rodent to the fast lane.

The pricey (\$175) BallPoint isn't really a mouse at all; it's a very small (approximately 1 by 3 by 3 inches HWD) trackball that clamps to your laptop's keyboard. When separated from its clamp, the BallPoint looks like a fried egg, with the ball taking the place of the yoke.

The clamp assembly is cleverly designed to mate with a variety of keyboards. Microsoft supplies several sets of the metal fittings that actually grab the keyboard, so the clamp can be adapted to many different systems. Attaching and removing the BallPoint is a simple matter of tightening or loosening two thumb screws; that's a good thing, because you have to remove the device every time you want to put away your laptop. The clamp is hinged, so you can position the BallPoint at several different angles relative to the keyboard.

The BallPoint has two sets of buttons, mounted on opposite sides of its rounded case. During installation, depending on how your own hand grasps the device, you are enabled to specify which set will work like traditional mouse buttons. But Microsoft has also come up with a use for the two switches you don't select. The "clicklock" feature, when enabled, allows you to drag screen objects with-

out holding down a button. You simply chord the two unused switches, then drag to your heart's content. To release the BallPoint from drag mode, you only have to click the secondary switches once more.

I easily attached the BallPoint to three different laptops—a Toshiba T1200, a Zeos 286 Notebook, and a Tandy 2810HD—without any need to change the clamp hardware.

Having the pointing device

secured to the side of the keyboard adds little to the system's footprint. And because the BallPoint is a stationary device it takes up less operating room than the smallest mouse.

When using the BallPoint with *Win* 3.0, I experienced only minor objections, and these were more a matter of my lack of enthusiasm for trackballs than of any design problems on Microsoft's part. I was acclimated to the BallPoint after a mere few minutes, especially after fine-tuning the sensitivity and acceleration levels with Microsoft's *Windows*-based configuration utility.

If you've gotta get graphical on the go, the BallPoint is a good way to make your point. If you're tempted to use the BallPoint with your desktop system,



you'll have to pay \$11.45 for an extender cable.

List Price: Microsoft BallPoint Mouse, \$175. **Requires:** DB9 serial port. Microsoft Corp., 16011 NE 36th Way, P.O. Box 97017, Redmond, WA 98073; 206-882-8080.

CIRCLE 706 ON READER SERVICE CARD

Little Mouse/PC

HANDS ON
by Robin Raskin

For some it's a lack of dexterity, for others it's a lack of desire, but regardless of the reason, there's a group of users who will never master the Microsoft BallPoint Mouse's trackball technique. Dyed-in-the-wool mouse users don't want to learn new gadgetry; they just want a smaller mouse. Little Mouse/PC, though not quite as small as one might hope, is a step in the right direction.

Mouse Systems' \$129 Little

Mouse/PC is a mini-sized optical mouse that provides the same accuracy and familiar motions as its larger counterparts, but in a considerably smaller package.

The Little Mouse/PC measures 1.5 inches wide by 4 inches long and weighs only 0.33 pounds. Its length is nearly identical to a standard mouse, but it's only about two-thirds the width. And although the dimensions are different, the Little Mouse/PC is about the same size as the Microsoft BallPoint Mouse. It will tuck nicely inside of any laptop or notebook carrying case. Unlike the BallPoint,

which needs an (as yet unavailable) extender cable to work with a desktop PC, the 6.5-foot cable on the Little Mouse is sufficient.

The Little Mouse/PC plugs into either COM port and is compatible with Mouse Systems or Microsoft drivers. The native driver includes an Ultra Res utility that lets you choose between ten levels of mouse acceleration; 300 cpi (counts per inch) is the base resolution, but by accelerating or decelerating (in effect multiplying the base resolution by a certain amount) the mouse emulates lower or higher resolutions. This makes it particularly well suited for switching between applications that require different degrees of accuracy.

The biggest drawback of the Little Mouse/PC, or any other optical mouse, is that you will always need to bring your reflective optical pad along with you. And while the thin, 0.17 pound, 7.75-inch by 7-inch rigid pad fits nicely in your laptop case or briefcase, it presents some problems when trying to work in small places.

List Price: Little Mouse/PC, \$129. **Requires:** 64K, DOS 3.1 or later, available COM port. Mouse Systems, 470505 Seabridge Dr., Fremont, CA 94538; 415-656-1117.

CIRCLE 702 ON READER SERVICE CARD



For laptop users who demand a traditional mouse rather than a more exotic pointing device, Mouse Systems offers the Little Mouse/PC, a smaller version of their optical mouse.

After 20 Million Pages Of PostScript Color Output, The Last One Looks As Great As The First.



MacWorld World Class Award
September 1990
PC Magazine Editors Choice
November 14, 1989



QMS ColorScript Printers... Brilliant and Resilient

Since 1987, QMS ColorScript™ 100 printers have produced over 20 Million hard copies and transparencies around the world! And because this color technology is engineered to use new ink with each print, the last page literally looks as bright and true as the first. This reliable QMS® technology has been united with the industry standards of Adobe® PostScript® and PANTONE® Color to put exciting, persuasive color at your fingertips page after page.

Presenting The ColorScript Model 10 Printer

If it's dynamic presentations you're after, you need the Model 10. From business presentations to training programs, the Model 10 delivers vibrant, visually exciting colors that help you communicate ideas clearly. QMS screen angling technology and special presentation inks make these unusually captivating colors possible. And it's a proven fact that color presentations increase audience information retention and raise a

recipient's tendency to act upon the information. So, in today's competitive business environment, the key question becomes, "Can we afford *not* to have the power of color?"

The ColorScript Model 30i Printer, Strictly For The Image Conscious

Extremely low cost Pantone-approved proofs in about 60 seconds. If you're a graphic designer, commercial artist or publisher it's easy to see how the Model 30i is revolutionizing your business. The QMS ColorScript 100 Model 30i is changing the relationship between speed, quality and cost by allowing you to do your job faster, cheaper *and* better!

The Model 30i is the first true "what-you-see-is-what-you-get" color printer. The colors you see on a Pantone-approved monitor are the same colors you'll see on a Model 30i proof *and* the same colors you'll see on the finished, printed piece. And the standard 11" x 17"/A3 paper handling capacity allows you to design actual size 8 1/2" x 11" full bleed proofs with crop marks.

True Adobe PostScript Guarantees Compatibility

Since Adobe introduced the PostScript page description language in 1984, it's become the industry standard for electronic printing and publishing. And

Features That Will Color Your Perception Of Business And Design Forever

- Compatible with Macintosh computers, IBM PC's and clones and other popular systems
- 35 resident Adobe PostScript typefaces all scalable and rotatable
- Model 30i has standard 8 MB RAM/1 MB ROM
- Model 10 has standard 5 MB RAM expandable to 8 MB RAM
- Model 10 prints letter- and legal-size paper and transparencies
- Model 30i prints letter-size and 11" x 17" paper and transparencies
- AppleTalk®/RS-422, RS-232 serial and Centronics® parallel interfaces provide compatibility with most micro, mini, mainframe and workstation hosts
- External SCSI interface supports up to seven additional hard drives of unlimited size
- 68020 MPU-based controller plus exclusive QMS ASAP™ technology means fast first-page-out performance
- Prints high-quality Adobe PostScript text and graphics at 300 x 300 dots per inch
- HP-GL® emulation software included

with the QMS ColorScript 100 Model 10 and Model 30i, you get guaranteed compatibility and consistency. PostScript imitations, on the other hand, may not be 100 percent compatible with Adobe's PostScript.

Two Top Performers Right Out Of The Box

Whether you choose the Model 10 or the Model 30i you can be up and running within minutes. Both printers are designed for maximum compatibility with Macintosh® computers, IBM® PC's and compatibles as well as many other systems. And, for additional support, QMS's technical and service professionals are standing by to assist you with answers that will get you up to speed fast. Call us today and we'll help you decide which printer best suits your needs. Or FAX QMS Product Information at (205) 633-4866.

1-800-523-2696 EXT. 33

QMS
Where Imagination Leads

*PANTONE is a Pantone, Inc.'s check-standard trademark for color reproduction and color reproduction materials.
PANTONE Colors generated by QMS PostScript printers are four-color simulations and may not match PANTONE-identified solid color standards. Use current PANTONE Color Reference Manual for accurate color.
The following are trademarks or registered trademarks of their respective companies: QMS, QMS ColorScript, ASAP, and the QMS logo of QMS, Inc. Adobe and PostScript of Adobe Systems, Inc. IBM of International Business Machines Corp. AppleTalk and Macintosh of Apple Computer, Inc. HP-GL of Hewlett-Packard Company. Centronics of Centronics Data Computer Corp.

First Looks

Bitstream's Expandable Type City and Pacific Data Products' 51-Font Library Feed Your Font Habits

HANDS ON
by Edward Mendelson

Meet two different LaserJet font cartridges. Each does the unexpected with exceptional panache. Bitstream's Type City offers a unique combination of superb bitmap fonts with customizable expansion options. Pacific Data Products' Complete Font Library Cartridge packs more scalable LaserJet III fonts into a small package than anyone believed possible.

Bitstream's offering—its first font cartridge—is by far the most surprising. While everyone else scrambles to release scalable font cartridges for the LaserJet III, Bitstream has chosen to use bitmapped fonts instead.

The \$379 Type City works in any LaserJet II, III, or compatible. Carved out of Type City's bulky body are four slots for miniature daughtercards that

can contain additional Bitstream fonts or customized logos, forms, and signatures.

In the age of the LaserJet III, a bitmap cartridge can seem archaic, but corporations with hundreds of earlier LaserJet models can use Type City in all their printers, and the plug-in modules let all these printers use standardized logos and special characters, which can be updated or replaced. Custom modules start at \$150 each, but in requiring a minimum order of five, Bitstream is clearly aiming at the corporate market. You can also order modules with any of the 207 faces from Bitstream's Speedo library.

The fonts in the basic cartridge are designed for standard correspondence and low-end desktop publishing use. You get Bitstream's Swiss, with italic, bold, and bold condensed varieties, in sizes ranging from 8 to 36 points; and Zapf Calligraphic

(a version of Palatino), with italic and bold, in sizes ranging from 8 to 30 points. One disadvantage is that not all styles come in all sizes; italics, for example, come only in 10- and 12-point. You also get a handsome monospace font, based on Helvetica, which is ideal for spreadsheets; the decorative Ribbon font for headlines; and four sizes of a symbol font. Text sizes use the ECMA-94 character set, which has a substantial range of business and foreign characters.

Bitstream includes one plug-in daughtercard with the base cartridge. This adds three sizes of Letter Gothic and a 30-point Old English headline type. Presumably because there was space left over, Bitstream added 20 characters from the admittedly silly Old Dreadful font. These characters include pictures of fried eggs, wagging fingers, zippers, and other images that you don't need.

Two other plug-in cards, at \$99 a piece, provide sets of headline and symbol fonts; a third has some landscape versions of fonts for those printers that are not able to rotate fonts automatically. Another set of plug-in cards, at \$129 each, offers roman, italic, and bold versions of standard Bitstream faces like Dutch, Hammer-smith, Bitstream Charter, and Century Schoolbook.

Bitstream's installation works well with *WordPerfect*, *Microsoft Word*, and *Microsoft Windows* and optionally installs matching *Windows* screen fonts. The lavish box includes a witty guide to type, a clear manual, and more inserts and order forms than you can count.

Pacific Data Products' \$399 Complete Font Library Cartridge works only in the LaserJet III series, and it uses the same Intellifont scalable typeface technology used in the CG

Times and Univers fonts included in the LaserJet III itself. The cartridge contains 51 typefaces and matches the two identical cartridges that PDP formerly sold as Pacific Outlines I and II. A new technology invented by PDP tricks the printer into working with a cartridge that holds twice the data the printer thinks it can access.

The 51 scalable fonts are really four varieties each of 12 well-known typeface families, plus two display faces and a set of ITC Zapf Dingbats. All are licensed from AGFA Compugraphic. The principal rationale for selection seems to have been that these were among the first faces issued in AGFA's Intellifont format.

You get an excellent Garamond but weak imitations of Palatino and Optima. You get faces that make many designers cringe, like ITC Souvenir and ITC Benguiat, plus Bookman and Schoolbook, which aren't much better, and Bodoni, whose thin lines reproduce badly at 300 dpi. Surprisingly, PDP includes no symbol, script, or monospaced font. You can print fonts at sizes ranging from 0.25 point to 1,000 points.

PDP's installation works smoothly with *GEM Ventura*, *Windows*, *Word*, and *WordPerfect*. A mail-in card brings you a copy of Intellifont for *Windows* (reviewed on page 50), with scalable screen fonts to match the ones in the cartridge.

Neither Bitstream nor PDP has come up with the perfect LaserJet cartridge, but one of their two new models is likely to fill most users' needs. And if you want a custom cartridge for corporate use, Bitstream's offering is the obvious choice. ■

List Price: Type City, \$379; optional plug-in cards, \$99 and \$129, or \$150 for special orders. **Requires:** LaserJet II (or better) or compatible. Bitstream Inc., 215 First St., Cambridge, MA 02142; 617-497-6222.

CIRCLE 433 ON READER SERVICE CARD

List Price: Complete Font Library Cartridge, \$399.

Requires: LaserJet III, IIId, or IIISi. Pacific Data Products Inc., 9125 Rehco Rd., San Diego, CA 92121; 619-552-0880.

CIRCLE 434 ON READER SERVICE CARD

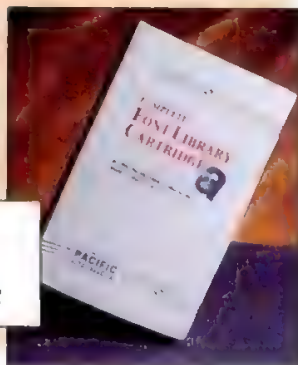


Type City houses a workaday collection of bitmap fonts. Optional plug-in cards add to its repertoire.

CG Bodoni Book
CG Palacio
ITC Bookman

The Complete Font Library Cartridge holds twice as many fonts as older PDP cartridges.

Monospace Roman
Swiss Roman
Zapf Calligraphic





Our Latest PostScript Printer Technology Impressed The Experts...



MacUser,
Editor's Choice Award
(Eddy), Jan. 9, 1991



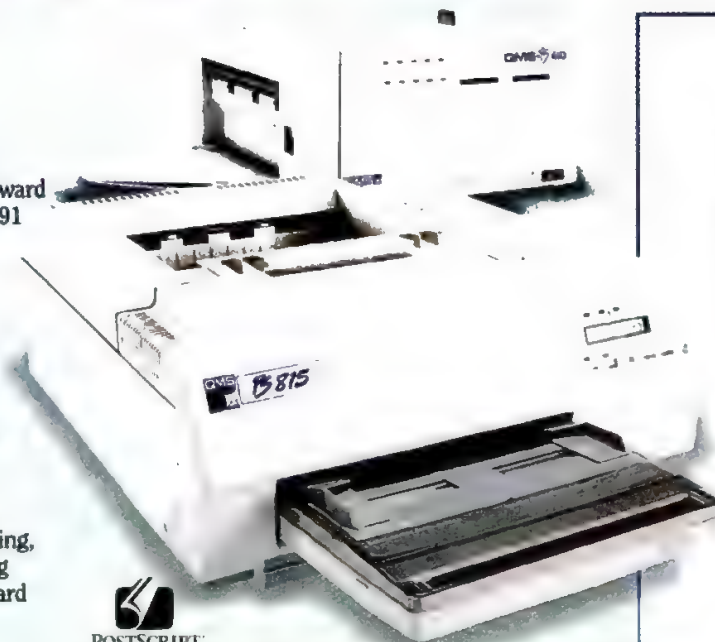
PC/Computing,
Most Valuable
Product,
Nov. 1990



BYTE,
Editor's Product
Merit Award,
Jan. 1991



Personal Publishing,
1990 Outstanding
Achievement Award



QMS-PS 410, 815 & 825 PostScript Laser Printers

- ESP - Emulation Sensing Processor (printer interprets incoming printer language and switches automatically)
- SIO-Simultaneous Interface Operation (allows the printer to receive data from three interfaces simultaneously)
- LocalTalk, RS-232C serial and Centronics parallel interfaces (connects to IBM® PC's, Apple® Macintosh® computers and most mini computers and mainframes)
- 45 resident Adobe PostScript typefaces (all can be scaled from 4 points upward, rotatable, all with multilingual character sets)
- Front Panel Display on QMS-PS 815 & 825 (16-digit multilingual LCD array conveys printer status, allows user to quickly configure printer)
- Resident HP LaserJet Series IIP & PostScript emulations (prints PostScript & HP applications, HP-GL emulation cards available)
- QMS ASAP III Technology and 68020 Microprocessor (exclusive technology means fast first-page-out performance)
- PS Executive Series™ Utilities Software (to easily set printer parameters)

...So We Decided To Give Them More Of A Good Thing.

Before we developed the QMS-PS® 410 four page-per-minute laser printer, we performed one very important task. We listened to what you wanted. Then we engineered a printer light years ahead of the rest with features that aren't available on other printers at any price.

And now, QMS brings you more of a good thing. The QMS-PS 815 and 825. Two eight page-per-minute laser printers with all the leading edge features of the 410 *plus* enhanced processing speed, an increased duty cycle and an easy-to-read, multilingual front panel that lets you quickly configure the printer to suit your specific needs.

Award-Winning Simplicity

How did these printers capture the imagination of an entire industry? The answer is, quite literally, simple! These leading edge printers are so simple to operate they seem to "think for you." Each printer features ESP® (Emulation Sensing Processor) which allows them to interpret incoming data and automatically choose the appropriate printer language without changing switch settings or sending complicated software commands. And to make things still simpler, the 410, 815

and 825 can receive data simultaneously to LocalTalk®, RS-232C serial and Centronics® parallel interfaces, which makes them the best on the market for mixed computer environments. All this and more is the result of QMS's exclusive ASAP™ III technology (Third Generation Advanced System Architecture for PostScript). And it's this proprietary QMS® technology that wins awards *and* customers.

True Adobe PostScript Plus HP Emulations

Whether you choose the 410, 815 or 825, you'll enjoy the desktop design flexibility of the latest version of Adobe® PostScript®. This most recent version includes the output enhancement of Adobe Type Manager™ (ATM). All printers come standard with 45 resident typefaces scalable from 4 points upward and fully rotatable. These PostScript printers guarantee compatibility with thousands of useful PostScript applications currently on the market.

For even greater flexibility, these printers feature standard HP® LaserJet® Series II emulation to support non-PostScript printing applications. And a variety of options makes the printers easily expandable. HP-GL®

emulation cards, HP compatible font cards, memory upgrades and extended paper handling capabilities are all currently available.

Expert Service And Support

As a recognized leader in PostScript printer technology, QMS maintains a commitment to customer satisfaction by providing free, responsive technical support. And to keep your QMS printer operating at its peak, QMS National Service offers a variety of service options. Call us today and see how QMS quite simply makes the best PostScript laser printers in the world. Or FAX QMS Product Information at (205) 633-4866.

1-800-523-2696 EXT. 31



Where Imagination Leads

The following are trademarks or registered trademarks of their respective companies: QMS, QMS-PS, ASAP, PS Executive Series and the QMS logo of QMS, Inc.; Adobe, PostScript, Adobe Type Manager and the PostScript logo of Adobe Systems, Inc.; Apple, Macintosh and LocalTalk of Apple Computer, Inc.; HP, LaserJet and HP-GL of Hewlett-Packard Company; Centronics of Centronics Data Computer Corp.; IBM of International Business Machines, Inc.
*patent pending

CIRCLE 164 ON READER SERVICE CARD

First Looks

NCR's WaveLAN: Moves Data at 0.6 Mbps Without Cables

HANDSON
by Sara Parker

Installing, expanding, or reconfiguring local area networks using traditional wiring is tough, especially in buildings that are older or unusually expensive to wire because of their construction. Wireless LANs using spread spectrum UHF radio technology, such as Editors' Choice winners LAWN from O'Neill Communications and ARLAN 450 from Telesystems SLW (see "The Next Wave: LANs Without Wires," May 29, 1990) offer an alternative to cables. However, both of these wireless LANs are still comparatively costly and slow.

NCR's WaveLAN doesn't do much to remedy the cost factor, but it is considerably faster. With its bridging capability and third-party support, WaveLAN is clearly taking the lead. WaveLAN's spread spectrum, which operates at slightly over 900 MHz and covers a frequency spread of 20 or more MHz, moves data nearly 10 times faster than ARLAN 450, its most direct competitor.

WaveLAN operates within a 1,000-foot radius and can be used to link every PC in a network to the server, or used as a bridge between cabled network segments. The product consists of an ISA-bus LAN adapter with a built-in radio transceiver. This is connected to an external omni-directional antenna that is housed in an unobtrusive case about the size of a deck of cards. Software includes *NetWare* LAN drivers as well as utilities for configuring the adapter and the network parameters. The WaveLAN card also has sockets to house chips for optional data encryption and a boot ROM for use in diskless workstations. An extension cable for the antenna and a directional antenna are also options.

We tested WaveLAN in a bridge configuration that linked a 386SX on a short network segment without a server into an existing *NetWare* 3.1 network. We used a Western Digital 16-bit adapter card in conjunction with Persoft's *Intersect Remote Bridge* on a networked 286 machine (see topology).

Our benchmark tests showed

3RD PARTY SUPPORT FOR NCR

WaveLAN has already garnered support from third-party add-ons. Persoft's \$4,095 *Intersect Remote Bridge* can link WaveLAN wireless adapters and Western Digital LAN adapters within one PC that is dedicated to the role of a routing bridge. This system gives you the ability to link LAN segments separated by as much as 1,000 feet across a campus, highway, or many floors in a building.

In February, 1991, ProTools announced an agreement with NCR to deliver a network control system for the administration of wireless networks. The company also claims that the full range of protocol monitoring capabilities found in ProTools' *Protolyzer* (First Looks, March 12, 1991) will be included in the company's network control system to support WaveLAN.—SP

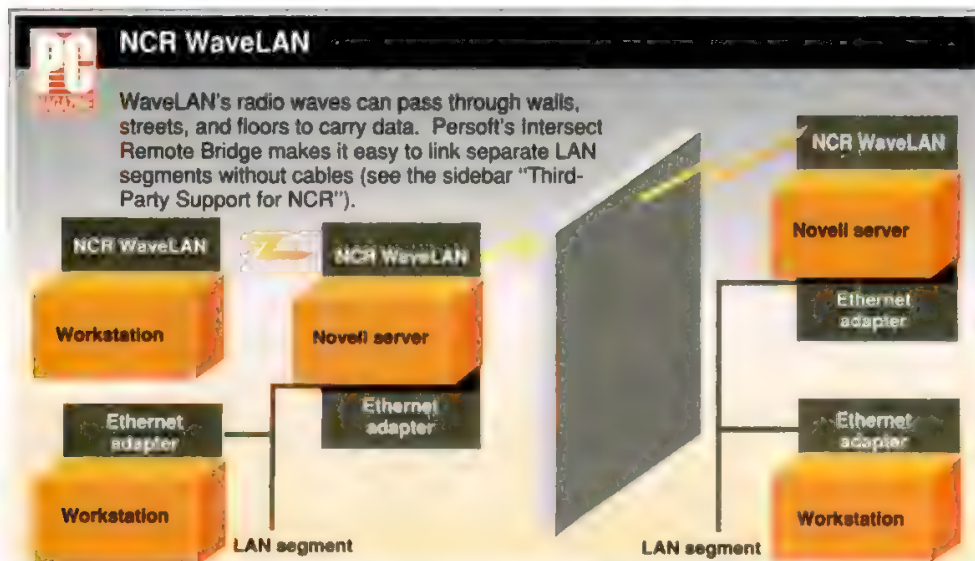
an average throughput of 0.58 megabits per second when requesting data in 512-byte blocks. Faster transmission rates of up to 0.67 Mbps were found on the larger block sizes. This makes WaveLAN almost ten times faster than the ARLAN product. Still, WaveLAN is much slower than a standard 10-megabit Ethernet connection; the same computer sustained a throughput of over 2 Mbps using the same Novell *NetWare* LAN wired with standard thin Ethernet.

WaveLAN installation is easy because there are no cables. If you know how to generate an IPX driver for *NetWare*, you know how to install WaveLAN. However, NCR had no drivers available for *NetWare*

3.1 during our testing.

The product's range depends on many factors including the radio frequency environment in the building, the type of antennas used on both ends, and the line of sight path between the antennas. And, although WaveLAN uses UHF radio frequencies near those of cellular telephones, we saw no degradation in performance when the unit was demonstrated near cellular or microwave equipment.

At \$1,390 per workstation, the cost of entry seems high, but when you consider that wiring a single node in a metropolitan area can cost as much as \$1,000, the price seems more reasonable. WaveLAN faces some stiff competition from Motorola's new Wireless In-building Network (WIN). However, Motorola's product will require an FCC license; WaveLAN does not.



FACT FILE

WaveLAN
NCR Corp., 1700 S. Patterson Blvd., Dayton, OH 45479; 800-544-3333.
List Price: per workstation, \$1,390; optional DES security feature, \$90.
Requires: DOS 3.0 or later, Novell *NetWare*, Version 2.1x.
In Short: WaveLAN isn't as fast as some conventionally wired LANs, but it's more flexible and faster than other wireless LANs.

CIRCLE 768 ON READER SERVICE CARD

The 11" x 17" PostScript Powerhouse

Just \$9995!



Features That Make The QMS-PS 2210 A True PostScript Powerhouse!

- Up to 11"x17" printing capability
- 22 pages per minute and QMS ASAP technology cuts waiting time
- 4 MB RAM builds complex pages quickly
- 39 resident Adobe PostScript typefaces
- HP LaserJet & HP-GL emulations for non-PostScript applications
- AppleTalk, RS-232 serial and Centronics parallel interfaces mean instant connectivity in practically all environments
- Choice of 350 or 600 sheet input capacity
- SCSI port allows connection of up to seven external hard drives for font caching and permanent storage of downloadable typefaces, emulations and PostScript programs
- PS Executive Series™ utility software allows each user to name, configure and align the printer as well as download fonts from the individual host computer

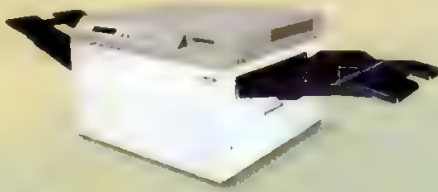
22 Pages Per Minute Give It The Best Price-To-Performance Ratio On The Market

It took QMS® to engineer a 22 page-per-minute PostScript® laser printer that stretches beyond the capabilities of other printers and *still costs less!* The QMS-PS® 2210 reaches beyond many others by giving you all popular paper sizes up to 11" x 17"/A3-size printing capability. And it surpasses others in print quality as well with laser-sharp fine line detail and rich saturated black fill areas. No more pale cut-and-paste newsletters, no more mismatched spread sheets, no more engineering and design projects held together with staples and tape! And the 2210 beats the competition price-wise, too, by delivering all this and more for just \$9995.

Perfect For The "Upscale" Network

The QMS-PS 2210 is perfect for a shared printer environment requiring high-quality 11"x17" output. Whether you use Macintosh® computers,

IBM®PC's/compatibles or most other mini computers and mainframes, you'll enjoy instant connectivity with AppleTalk®, RS-232 serial and Centronics® parallel interfaces. Should you require non-PostScript printing applications, the 2210 comes standard



with HP-GL® and HP® LaserJet® emulations. The 2210 also cuts waiting time with fast page processing made possible by QMS's exclusive ASAP™ (Advanced System Architecture for PostScript) technology and a 68020 microprocessor. That means fast first-

page-out performance. Add this to 350 sheet input capacity (600 sheets in the QMS-PS 2220) plus a 20,000 page-per-month duty cycle, and it's easy to see why the QMS-PS 2210 is a true network star!

Expert Service And Support

As a recognized leader in PostScript printer technology, QMS maintains a commitment to customer satisfaction by providing free, responsive technical support. And to keep your QMS printer operating at its peak, QMS National Service offers a variety of service options. Call us today and see how easy it is to put the true PostScript powerhouse to work for you. Or FAX QMS Product Information at (205) 633-4866.

1-800-523-2696 EXT. 32

QMS
Where Imagination Leads

The following are trademarks or registered trademarks of their respective companies. QMS, QMS-PS, PS Executive Series, ASAP, and the QMS logo of QMS, Inc. PostScript of Adobe Systems, Inc. IBM of International Business Machines Corp. AppleTalk and Macintosh of Apple Computer, Inc. HP, LaserJet, and HP-GL of Hewlett-Packard Company. Centronics of Centronics Data Computer Corp.

CIRCLE 141 ON READER SERVICE CARD

First Looks

Windows Screen Blankers: Blanking Your Screen Is Only the Beginning



If you think that reviewing screen blankers is as exciting as watching the grass grow, think again. *After Dark* and *Intermission* are both \$49.95 Windows screen blankers that not only blank your Windows screen but then go ahead and use that screen as a canvas for spectacular animation sequences.

After Dark began as a leading program on the Macintosh; *Intermission* is the retail successor to *Screen Peace*, a shareware program (now withdrawn from distribution) that caused a considerable stir following the release of Windows 3.0. Other blankers are available, most notably Fifth Generation's *Pyro*, slated to be ported from the Mac, and Microsoft's *Entertainment Pack*, which also includes a blanker. But *After Dark* and *Intermission* are definitely the trendsetters in this arena.

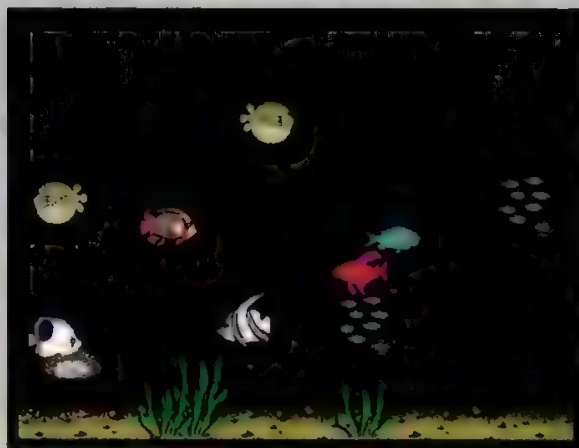
Both packages' basic shells are remarkably similar. Both will take over your Windows session after a specified period of inactivity, or once you move

the mouse into a specified "sleep corner." Once they take over, a predesignated graphics module kicks in. Each program comes with approximately 30 modules.

Some of the graphics in the modules are drawn by the program on the fly, some are built in, and some let you supply your favorite Windows .BMP image. Certain modules blank the screen and then animate it with abstract designs like a kaleidoscope, or with concrete objects like swimming fish. Other modules work with the underlying Windows screen. For example, *Intermission* includes a module that slowly melts the current screen display.

Both provide a mechanism for third parties to write their own blanking modules; documentation for modules written in C with appropriate header files are provided. Already, CompuServe has a number of additional *Intermission* modules posted, and there should be some for *After Dark* soon.

The original reason for a screen blanker's existence was to prevent screen burn-in. How-



After Dark's aquatic realm leaves scrumptious bitmaps swimming across your screen. Their flying toaster animation is near-classic.

ever, burn-in poses less of a threat with modern color monitors than it did with monochrome. Today, a more important reason is security. Blanking the screen prevents passersby from seeing your work. To increase security, both programs offer password protection where you supply a password to unblank the screen. They even allow you to password-protect Windows itself, although it would not be hard for a determined person to get around this low-level protection.

While the programs have much in common, there are differences. *Intermission* allows more module customization, and it provides documentation on all provided modules. *Intermission* also includes an additional utility to manage your Windows wallpaper. *After Dark* lets you specify a hotkey to blank the screen, and it includes a mode where it monitors your serial port and decreases its share of CPU use if the port is active, thereby avoiding possible conflict with background communications downloads.

Intermission can be invoked over a DOS screen when you are in 386 mode, but it provides no DOS blanking in other modes. *After Dark* will blank DOS screens in any Windows mode provided you load a 4K TSR before loading Windows. Like *Intermission*, it blanks the DOS screen in any mode, but animates the blanked DOS screen

only if you are in Windows 386 mode.

Version 1.1 of *Intermission* is expected to be released shortly after you read this. The new version, which we saw in beta, has three new interesting features. It will run *After Dark* 1.0 modules; it has a mode where several different animation modules can be run on separate parts of the screen simultaneously; and it has some new game modules that allow user interaction.

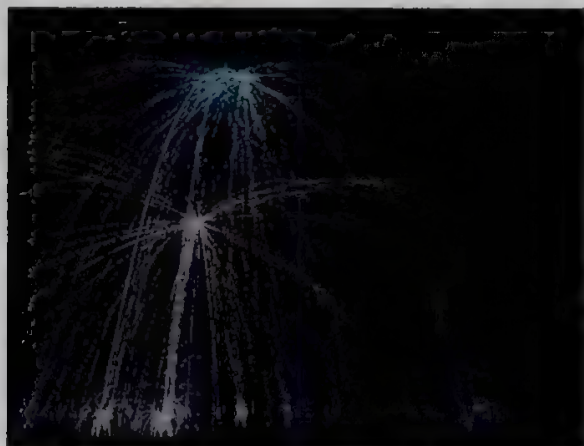
My favorite of all 60 modules was *After Dark's* aquatic realm, where multicolored tropical fish swim on-screen. But my next three choices were all from *Intermission*: The kaleidoscope and mosaic modules were my picks among the abstract designs, and the fireworks module caught my fancy. To make your own decision, you'll really need to pay a visit to a store where you can see a demo, but every serious Windows user will want to consider one or the other.

List Price: *After Dark*, Version 1.0, \$49.95. **Requires:** Windows 3.0. Berkeley Systems, 1700 Shattuck Ave., Berkeley, CA 94709; 415-540-5535.

CIRCLE 431 ON READER SERVICE CARD

List Price: *Intermission*, Version 1.0, \$49.95. **Requires:** Windows 3.0. ICOM Simulations, 648 S. Wheeling Rd., Wheeling, IL 60090; 800-877-4266, 708-520-4440.

CIRCLE 432 ON READER SERVICE CARD



Intermission's explosive fireworks make every day the Fourth of July for your computer screen. Other modules include a scintillating kaleidoscope.

ZEOS[®]
386[™]SX.



“With
so much
going for it,
how could you
go wrong?”

— *PC Magazine*



You Simply Can't Go Wrong!

"The ZEOS 386SX-16 successfully combines the two things people most want in their systems: solid performance and attractive pricing... The ZEOS is the fastest SX tested."

*PC Magazine, On why the ZEOS[®]
386SX Wins Editor's Choice.*

Starting complete at only \$1,295 the ZEOS 386SX will be your choice too. Come on in and take a look!

award winning ZEOS 386SX for only \$1295? After all, there are *no compromises* in this system. Quite frankly, a great price is the result of many ZEOS advantages.

For instance. Unlike most of the others, ZEOS maintains its own chip level Research and Development staff *plus* our own board level manufacturing facilities. All right here in St. Paul. When it comes with the ZEOS® name it comes with World Class Quality. It's the best you can buy.

You are saving too because you are buying direct from ZEOS. And you can buy with confidence because ZEOS is a strong and rapidly growing public company (NASDAQ Symbol: ZEOS). Our professional Systems Consultants and expert Technical Support staff serve tens of thousands of customers World Wide, twenty four hours a day. And these are happy customers. How do we know?

Because nearly 50% of our system sales comes from previous ZEOS customers. Now that's incredible! But that won't surprise you

after you buy your first ZEOS system. You'll be back too.

ZEOS 24 HOUR A DAY SUPPORT.

It was ZEOS who invented 24 Hour Tech Support and is it ever good! Anytime you need help your telephone is a Toll Free Hotline direct to your own personal technician—

one who knows your system inside and out. We're here if you need us. Toll Free, Around the Clock, Every day. No additional charge.

And that's only the start of your ZEOS Customer Satisfaction Package.

Add to it our 30 Day Absolute Satisfaction Money Back Guarantee, One Full Year Limited Warranty and our Express Parts Replacement Policy. You're going to be very satisfied. We don't just say it. *We Guarantee it.*

ORDER YOUR OWN ZEOS 386SX TODAY!

Ordering your ZEOS 386SX is easy. Simply pick up the phone and give us a call at 800-423-5891. Buying the ZEOS 386SX is perhaps the best purchase decision you'll ever make! After all, your satisfaction is absolutely *Guaranteed.*

ORDER NOW TOLL FREE:

800-423-5891

DON'T FORGET THE OPTIONS!

As *PC Magazine* said, ZEOS offers "more options than even the most configuration hungry hound could possibly need." Because every ZEOS system is custom built you may choose from a huge selection of hard drives, video packages and many other options. On-site service is available too. Call 800-423-5891 for details.

YOUR COMPLETE ZEOS 386SX HARD DRIVE SYSTEM INCLUDES ALL OF THESE FEATURES FOR ONLY \$1295!

20MHz Systems Available too!

- '386SX-16 CPU. 8/16MHz Dual Speed, Keyboard selectable. Reset/Turbo Buttons.
- Fast 42MB IDE Hard Drive, 1.2MB Teac® Floppy Drive.
- 512K of high speed memory expandable to 16MB.
- ZEOS 14" flat screen High-Res amber monitor with Tilt and Swivel Base.
- Genuine Hercules® brand graphics controller!
- ZEOS/RS Enhanced keyboard with pleasant Tactile/Click feel.
- Two high speed serial ports plus parallel and game ports.
- Six 16-bit and two 8-bit expansion slots.
- Speed demons appreciate our Shadow RAM/EMS capability, and full 387SX support.
- Includes our 7-bay ZEOS space saver case. Two cooling fans and 200Watt power supply for added expandability and reliability. Top notch.
- Plus your ZEOS Absolute Satisfaction 30 Day Money Back Guarantee, Full One Year Limited Warranty and Express Replacement Parts policy.
- Wrap it all up with 24 Hour a Day Toll Free Technical and Sales support on your ZEOS Hotline. You've got a winner!

ORDER NOW TOLL FREE

800-423-5891

Fax Orders dial: 612-633-1325

In Minnesota Call: 612-633-4591

Hearing Impaired (TDD):

800-228-5389

Government Orders:

800-245-2449

Outside U.S./Canada: 612-633-6131

MasterCard, VISA, Discover,

AmExp, Z-Card and COD.



RELEASE 5.0

on	Conventional Memory
	0.49
	0.83
	0.83

TAKE YOUR PICK!

Choose from 4 great money saving packages.

or specify your own custom configuration!

The Complete ZEOS 386SX, Package #1. Your complete 386SX system!

ONLY \$1295

This is your complete 386SX system for only \$1295. It includes all the features described in the column to the left. System highlights include:

- Screaming ZEOS 16MHz 386SX motherboard.
- Ultra-fast 42MB IDE Hard Drive.
- Genuine Teac® 1.2MB floppy.
- 512K of High Speed 60ns DRAM, 16MB capacity.
- Shadow RAM/EMS capability, 387SX support.
- ZEOS 14" Flat Screen Tilt/Swivel Amber Monitor.
- Genuine Hercules® Graphics Card.
- Two Serial, one Parallel and one Game Port.
- ZEOS SuperCase: 2 Cooling Fans, 7 Bays, 200 Watt power supply.
- ZEOS R/S 101 keyboard.
- 30 Day Absolute Satisfaction Money Back Guarantee.
- One Full Year Limited Warranty, with Express Parts Replacement.
- 24 Hour a Day Toll Free Technical Support.

The Incredible Upgrade Package #2

ONLY \$1895

We take Package #1 and upgrade your Editor's Choice system to include:

- Top quality 16-bit high res 1024 VGA color graphics card with 512K video RAM.
- ZEOS 14" High Res 1024x768 VGA Color Monitor with Tilt & Swivel.
- One full Megabyte of 60ns DRAM.
- Microsoft® DOS 4.01 with Disk Cache Software.



**PC Magazine
said it best.**

**"Great expandability,
quality parts, and
down-to-earth
pricing...the
result is a winner."
— Editor's Choice!**

20MHz Now Available!

Call now for details on
the New ZEOS 386SX-20.
Complete with 64K
SRAM Cache! Absolutely
Incredible. Add only \$200
to any package.

Incredible Upgrade Package #3

ONLY \$2095

Now take Two megabytes of memory and a second floppy drive and save even more! Your extras now include:

- Top quality 16-bit high res 1024 VGA color graphics card with 512K video RAM.
- ZEOS 14" High Res 1024x768 VGA Color Monitor with Tilt & Swivel.
- Two full Megabytes of High Speed DRAM.
- A second Teac floppy drive, 3.5", 1.44 MB.
- Microsoft® DOS 4.01 with Disk Cache Software *plus* Microsoft Windows™ 3.0 and mouse!

Incredible Upgrade Package #4

ONLY \$2295

Want an even bigger hard disk? Package #4 gives you all the extras *plus* our Fast 85MB hard drive. Outrageous savings!

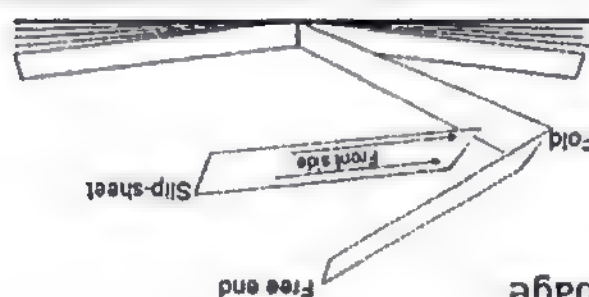
- High Speed 85MB IDE Hard Drive.
- Top quality 16-bit high res 1024 VGA color graphics card with 512K video RAM.
- ZEOS 14" High Res 1024x768 VGA Color Monitor with Tilt & Swivel Base.
- Two full Megabytes of High Speed DRAM.
- A second Teac floppy drive, 3.5", 1.44 MB.
- Microsoft® DOS 4.01 with Disk Cache Software *plus* Microsoft Windows™ 3.0 and mouse!

**ORDER NOW TOLL FREE:
800-423-5891**

Your own ZEOS 386SX!

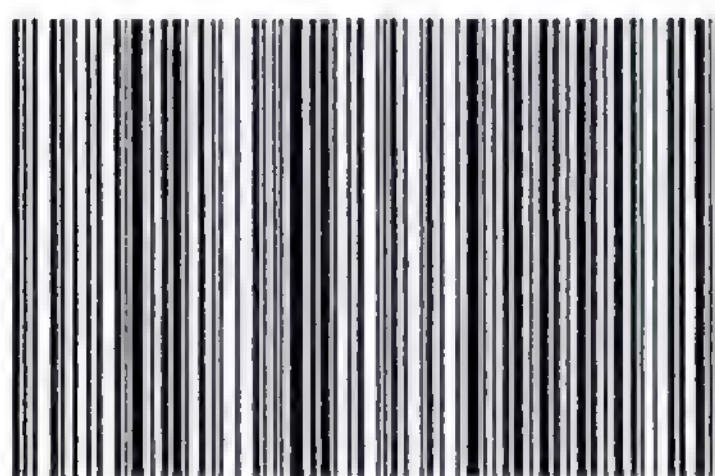
Only \$1295

Call Now!
800-423-5891



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet

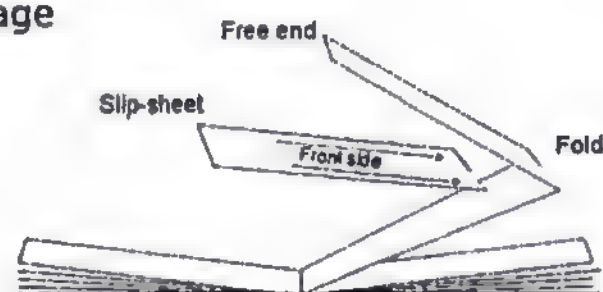


GbsSlipSheet-001

Folded edge of the page

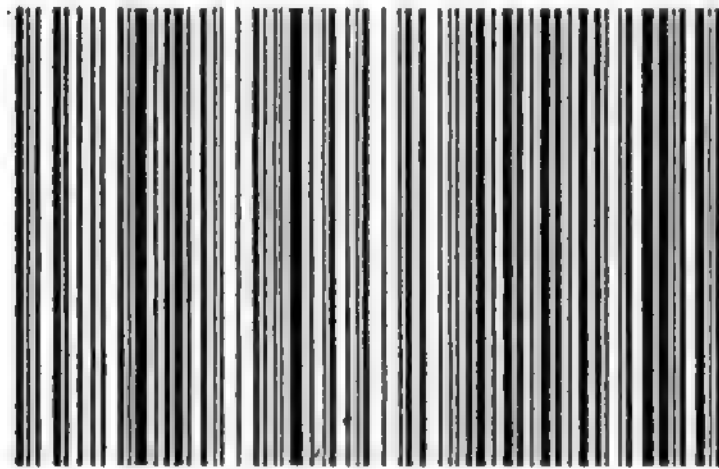
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-001B

Back

1. Follow instructions on the other side

YES, COMPLETE. \$1295

Editor's Choice! "ZEOS comes in a winner... The fastest SX tested... packing plenty of value... great expandability, quality parts and down to earth pricing... how could you go wrong?" *PC Magazine, Editor's Choice.*

How could we say it any better? You simply can't go wrong. The ZEOS 386SX is the best you can buy.

And right now, you can buy your own *complete* ZEOS 386SX 42MB hard drive system for only \$1295!

Nothing can touch it. The ZEOS 386SX gives you Guaranteed Value you simply can't get anywhere else. And ZEOS is America's premier '386 systems manufacturer. After all, *PC Magazine* selected ZEOS '386 systems "For Overall Excellence" above all others. But why do they call the ZEOS 386SX "a terrific choice"? Four key reasons:

Performance. Quality

**ZEOS
386SX**

YOU WANT PERFORMANCE? THIS IS IT!

ZEOS has invested literally thousands of hours creating the world's finest 386SX.

And as *PC Magazine* said "it is the fastest SX tested", an awesome performer indeed!

This is no rehashed '286 design. It's a true '386 from the ground up. A Rock Solid Investment that runs circles around everything else out there.

PC LABS BENCHMARK SERIES

	Instruction Mix	Floating Point Calculation
ZEOS 386SX/16	3.99	6.98
IBM PS/2 Model 55SX	4.46	8.46
Compaq Deskpro 386S	4.48	9.67

QUALITY YOU CAN COUNT ON. ZEOS QUALITY.

Your ZEOS 386SX is designed and manufactured right in our own laboratories. We have used only the *very best* components available. From the power supply right thru to the video, every component is absolute top quality.

As an example. If you order a mono system you'll appreciate the fact that we use only genuine Hercules® brand monochrome graphics cards. They cost us more than double what others pay for their cheaper "Hercules compatible" cards. But Hercules® is quality. Quality you deserve.

And if you're a VGA buyer you'll absolutely *love* our VGA display. As *PC Magazine* said "the ZEOS VGA display and card prove to be one of the fastest overall... tying with the Compaq Deskpro 386S." Now that's *hot* video!

Even the floppy drive. Yours will be a genuine Teac®. They cost a lot more but you simply can't buy better. ZEOS systems. Quality from the ground up.

AN INCREDIBLE PRICE FOR AN INCREDIBLE MACHINE.

Incredible is the word! How can we build your

Purchase orders from Fortune 1000 companies, Governments and institutions subject to approval. Leasing programs available. Microsoft, MS-DOS and Windows are trademarks of Microsoft Corporation. IBM and PS/2 are trademarks of IBM Corporation. St. Paul, MN 55112 USA.

10 Good Reasons To Buy From ZEOS®

Reason #1

"Overall Excellence."

As *PC Magazine* said "Price is always a consideration. So are benchmark test results. But both factors can be deceiving, which is why we consider them in the context of other aspects that will make the difference months and years down the road."

These are the attributes which *PC Magazine* used in awarding ZEOS the coveted Editor's Choice, not once but seven times. And "Overall Excellence" are the very words *PC Magazine* used in describing ZEOS systems comparing them to all others.

Reason #2

Dazzling Performance.

In one recent '386 review, *PC Magazine* awarded ZEOS Editor's Choice. "The ZEOS '386 blows away every other computer... a smart choice" is what they said. And in another recent review, *Government Computer News* said the ZEOS 33MHz '386 is "arguably the fastest MS-DOS and OS/2 micro in the world."

Dazzling Performance is built into every ZEOS system. It's a key component of ZEOS Overall Excellence.

Reason #3

Exceptional Quality.

PC Resource Magazine put it this way, "ZEOS... provides quality comparable with IBM or Compaq and does so for about 70% of the price." ZEOS uses only the very best components. And every system is fully tested and burned-in right in our own labs.

Reason #4

Value.

InfoWorld says, "We find the ZEOS '386 an excellent value. Speed: Excellent. Compatibility: Excellent.

Value: Excellent."

Personal Computing said, "ZEOS... is the best value we've come across... its performance is right up there with the slickest, most expensive PCs you can buy."

Reason #5

Warranties and Guarantees.

ZEOS believes in its products. That's why we offer each and every customer our 30 Day Absolute Satisfaction Money Back Guarantee, no questions asked. Plus, our One Full Year Limited Warranty and Express Parts Replacement Policy. Optional On Site Service is available too. Call for details.

Reason #6

24 Hour Toll Free Technical and Sales Support.

At ZEOS, the customer is #1. That's why we invented 24 Hour a Day Tech Support. For *your* convenience. If you buy a product from us we feel we should be there to help, any time of the day or night. Give us a call Toll Free! 800-423-5891. Anytime!

Reason #7

Experience.

Almost unique in the mail order computer industry, ZEOS maintains its own chip level Research and Development staff. In addition to Systems Manufacturing, we also operate our own Board Level Manufacturing facility.

ZEOS has been involved in Research and Development since our incorporation back in 1981. Our strong and experienced Research, Manufacturing and Technical Staff translates into superior factory direct computer systems for you.

Reason #8

A Sterling Reputation.

In magazine after magazine and review after review ZEOS systems are cited for Overall Excellence, for Excellent Value, as the Right Choice and so on. All of this is flattering but the most important thing is this: What do our customers think? Frankly, they love us. The systems and the support. That means more to us than anything.

Reason #9

Easy to Buy.

ZEOS systems are easy to buy. You can pick up the phone any time of the day or night and order your new ZEOS computer. And we accept MasterCard, Visa, Discover, American Express, and Corporate Purchase Orders from Fortune 1000 Companies, Colleges, Universities and Governments. Complete Leasing Programs are available as well.

And now the Z-CARD! It's your very own ZEOS Credit Card and you can apply today. With the Z-CARD you can charge your ZEOS purchases and pay in easy monthly installments. It's just like a Bank Card. Why not apply for your Z-CARD now!

Reason #10

You're Going to be Very Satisfied.

When it comes right down to it, you're going to be very satisfied with your new ZEOS system. Our goal is your complete satisfaction. And that's our commitment to you. To quality. To performance. To reliability and support. To *Value*. We don't just say it, *we Guarantee it!*

FAX Orders Dial: 612-633-1325
In Minnesota Call: 612-633-4591
MasterCard, VISA,
Discover, AmEx,
Z-Card and COD
Open 24 Hours a
day, 365 Days
a year.

Order Now
Toll Free

800-423-5891



First Looks

Eye-Catching 3-D Charts Under Windows for \$99.95

HANDS ON
by Robert Kenner

Three-dimensional business charts sacrifice a bit of precision but often illustrate broad trends better than their flat counterparts. BLOC Publishing's *3-D Charts to Go!* generates 3-D graphs that add impact and appeal to any presentation.

This \$99.95 Windows package is so easy to use that you may never need the manual. You simply import or enter the relevant data in the program's spreadsheet and select one of 17 available chart patterns. A split-screen feature displays data while producing the chart.

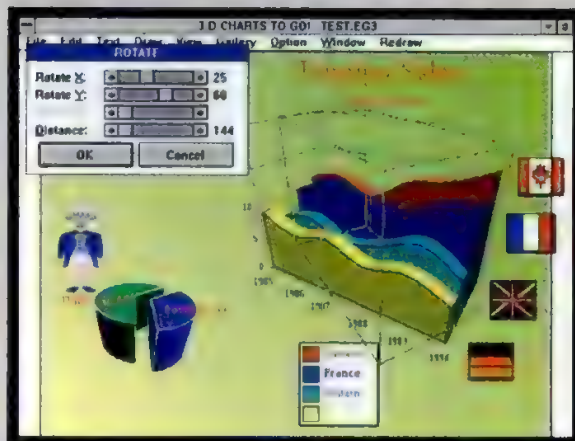
You can view a chart from various angles by rotating it along the x-, y-, or z-axis using sliders. You have a choice of true perspective or isometric or oblique projection. Other sliders let you stretch any axis and drag the chart around the page.

Switching among chart

types and modifying a chart layout is also easy. Line graphs—rendered as ribbons floating in space—can have either curved or segmented lines, and you can fill the area under a line to create area charts. Pie charts have individual explodable segments. You can rotate the chart for 2-D depictions (and view it straight on), but the results are unimpressive. The program also includes an on-screen slide-show facility, but you cannot mix the time intervals between slides, and there are no transitional effects.

3-D Charts to Go! brings in Microsoft Excel and Wingz data via the Windows clipboard, and it imports Lotus 1-2-3 .WKx files. But Excel 3.0 users will find that *3-D Charts to Go!* provides fewer chart formats than Excel, and it won't rotate a chart 180 degrees. Nor does it let you plot values along the z-axis.

Gradient color backgrounds and a small clip-art library are



Handsome 3-D charts, a simple clip-art library and an easy-to-use Windows interface make *3-D Charts to Go!* a valuable presentation tool.

included. You can also import .PCX, Windows .BMP, and Windows Metafile formats. LaserJet and PostScript output proved crisp and attractive.

The program exacerbates the accuracy problem inherent in 3-D charting. The data set closest to the grid isn't positioned flush against it; thus viewers will have trouble judging where the set lies in relation to it. With bar charts, an option to add tic marks alleviates the problem.

3-D Charts to Go! churns out attractive output with a minimal investment of time and money. It provides a textbook example of how a GUI can simplify the charting process. ■

List Price: *3-D Charts to Go!*, \$99.95. **Requires:** 640K RAM, graphics display, mouse, DOS 3.1 or later, Windows 3.0 or later. BLOC Publishing Corp., 800 SW 37th Ave., Miami, FL 33134; 305-445-0903.

CIRCLE 436 ON READER SERVICE CARD

FlashCard's Flash Memory Delivers Security for Diskless Workstations

HANDS ON
by Winit Fickson

Cardinal Technologies' FlashCard combines Intel's Flash ROM technology with Cardinal's own innovations to create a means of configuring and maintaining diskless PCs. Built into the Cardinal FlashCard RC1000 is DR DOS 5.0 and sufficient BIOS extensions to turn it into a virtual drive capable of booting its PC host. Beyond the boot files, the board will accommodate network drivers, user programs, or data up to capacity.

The 8-bit half-length board holds eight Flash ROM sockets, which accommodate either 128K or 256K Flash ROM chips for a total board capacity of 1MB or 2MB. All the chips on a board must be the same size.

Five disks containing the complete DR DOS 5.0 system and two special FlashCard utilities also accompany the board.

Flash ROM is a form of EEPROM (electrically-erasable programmable read-only memory). Like all other kinds of ROM, it is nonvolatile, so the data stored in it are preserved when you switch off the power. Unlike EEPROM chips, which require special high-power electrical signals to erase their contents, or PROMs, which use ultraviolet light for erasing, Flash ROM chips can be erased at signal levels inside your PC. Using the special software supplied by Cardinal, you can reprogram the Flash ROM card with whatever you like without pulling the chips out of your PC.

Flash ROM does not work like RAM, however. The entire

contents of a chip are erased simultaneously, so you can't update just 1 byte. Cardinal works around this by automatically copying the old contents of the Flash ROM to disk (either the network, a hard disk, or a floppy disk), erasing the Flash ROM, updating the data on the disk, then rewriting it to the Flash ROM. Although the process takes longer and consumes disk space, the payoff is safe storage and diskless booting.

Once the FlashCard is programmed, it can be removed from one PC and plugged into another. So a system manager can easily program all the diskless workstations in his group using his own PC.

Installing and using the Flash ROM card is easy: Just plug it in. It boots its PC host almost instantly after the system memory check and power-on self-test are completed. The card appears as the next logical

read-only drive. You'll have to install DR DOS 5.0 and its utilities so that you don't encounter conflicts between that operating system and MS-DOS.

Although this \$199 expansion board won't change the PC world, it may delight computer professionals charged with maintaining order among diskless workstations. If you want to streamline a stock of diskless network stations, are interested in Flash ROM technology, or just want a copy of DR DOS 5.0 (the board lists for the same price as DR DOS alone), the FlashCard deserves a look. ■

List Price: FlashCard RC1000 Series, with 128K, upgradable to 1MB, \$199; with 256K, upgradable to 2MB, \$299 (volume orders only). Cardinal Technologies Inc., 1827 Freedom Rd., Lancaster, PA 17601; 800-233-0187, 717-293-3000.

CIRCLE 436 ON READER SERVICE CARD

First Looks

Hotshot Imagebase: DOS's Scrapbook for Graphics

HANDS ON
by Larry Brown

Symsoft's \$149 *Hotshot Imagebase (HSI)* gives DOS users the kinds of image cataloging capabilities that *Windows* utilities like *Scrapbook Plus*, *Multitack*, and *ImageIn Album* provide.

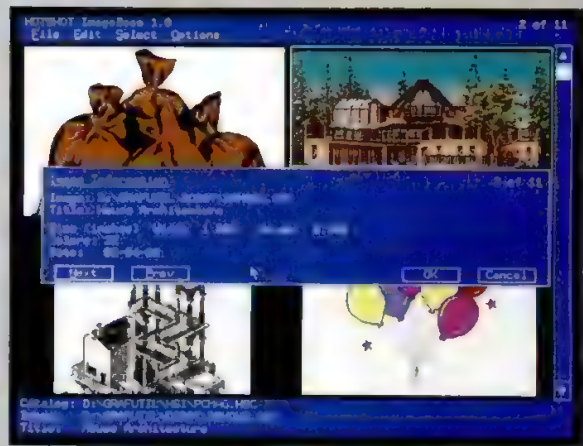
HSI has two main components. One makes and maintains catalogs of graphics files; the other is a TSR that accesses those catalogs from within supported DOS applications. The catalogs support .PCX, .IMG, TIFF, CompuServe .GIF, .MSP, *WordPerfect's* .WPG (raster and vector), .CGM, Lotus .PIC, and Symsoft's own .HG formats. Each time you add a graphic, the filename and a thumbnail representation of the image are stored in the catalog. Thumbnails can be reviewed either 4 or 16 at a time,

and each can be stored along with searchable keywords.

Since the catalogs store only the thumbnails and filenames, they use relatively little disk space. For example, a catalog that included a mixed sample of 11 files totalling 540K occupied only 175K extra.

Invoking the TSR inside an application gives you access to the last catalog you viewed in the standalone program. The TSR module includes support for *WordPerfect 5.0/5.1*, *DrawPerfect 1.1*, *Ventura (GEM version) 2.x* and 3.0, and *Microsoft Word 5.0/5.5*. Occupying 26K RAM, the TSR proved a tight fit with *Ventura*.

When you exit *HSI* and return to the underlying application, *HSI* pastes in the set of commands that adds the selected catalog image to your document or drawing. With *Ventura*,



HSI's catalog program will show 4 or 16 thumbnails at a time and display information about a selected thumbnail.

this requires setting up the frame and menu choices properly, but in the other programs, *HSI* enters all the necessary keystrokes automatically.

HSI lacks support for a few important file formats: .BMP, .GEM, and .EPS. Also, users would benefit from a generic paste option that would allow you to paste cataloged images into applications outside of the

four directly supported ones. I miss the seamless integration of *Windows* applications, but *HSI* performs a useful service with competence and grace.

List Price: *Hotshot Imagebase*, Version 1.0, \$149. **Requires:** 512K RAM, DOS 2.1 or later; mouse recommended. Symsoft Corp., Call Box 5, Incline Village, NV 89450; 702-832-4300.

CIRCLE 704 ON READER SERVICE CARD

Two Free LaserJet III Tools from HP

HANDS ON
by Edward Mendelson

Hewlett-Packard is so determined to persuade you to use PCL5 scalable fonts with your LaserJet III that they're giving away software to help.

HP's *Intellifont for Windows 3.0* provides scalable *Windows* screen fonts to match the scalable CG Times and Univers printer fonts built into the LaserJet III, and lets you supplement them with screen fonts that match PCL5 soft fonts supplied by HP or AGFA Compugraphic. HP's *Fontware for the HP LaserJet III* converts Bitstream's Fontware typefaces into scalable PCL5 printer fonts.

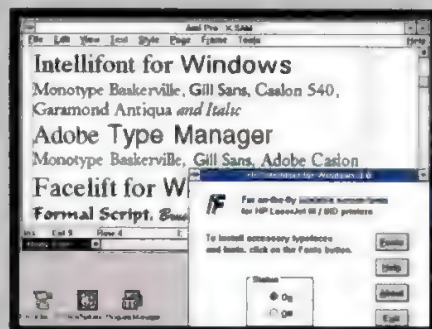
Intellifont for Windows resembles *Adobe Type Manager* or *Bitstream's FaceLift*. It builds on-the-fly screen fonts that work with most *Windows* applications. Unlike *ATM* or *FaceLift*, you can use it only

with LaserJet III series printers, but it works simultaneously with *ATM* and *FaceLift* in the same system. With all three, LaserJet users have access to matching screen and printer fonts in all three major scalable PC formats: PCL5, PostScript, and Bitstream's Speedo.

In addition to the built-in fonts, you can install HP or AGFA scalable typefaces in packages priced from \$159 to

\$249. Although other vendors supply PCL5 fonts, only these fonts include data needed for creating on-the-fly screen fonts.

Intellifont, Version 1.0, isn't perfect. It overwrites your *Windows* LaserJet driver with a new version that slightly scrambles landscape printing, and its font installation screen confusingly lists screen fonts and printer fonts separately. Free upgrades, available in a few weeks from HP or on CompuServe, will include a fix.



Intellifont for Windows works in the same system with *Adobe Type Manager* and *FaceLift*. Shown here are fonts from all three.

Fontware for the HP LaserJet III converts any of Bitstream's 207 Fontware typefaces into PCL5 printer fonts. Unfortunately, HP's own utility doesn't provide the data *Intellifont for Windows* needs for generating screen fonts from these, but you can use the converted fonts as printer fonts for *Windows* or any other application (like *WordPerfect*) that supports HP's Autofont installation.

PCL5 fonts are generally coarser than their Type 1 or Speedo counterparts, but for most desktop publishing purposes, the differences are slight. And if you already have Fontware faces, their PCL5 equivalents won't cost a cent. **List Price:** *HP Intellifont for Windows* and *Fontware for the HP LaserJet III*, free. **Requires:** For *Intellifont: Windows 3.0*; for *Fontware*: 640K, DOS 3.1 or later. For both: LaserJet III. Hewlett-Packard Co., StarPak, P.O. Box 1404, Greeley, CO 80632; 303-353-7650.

CIRCLE 705 ON READER SERVICE CARD

Quick, name the world's best memory manager:

NETROOM!

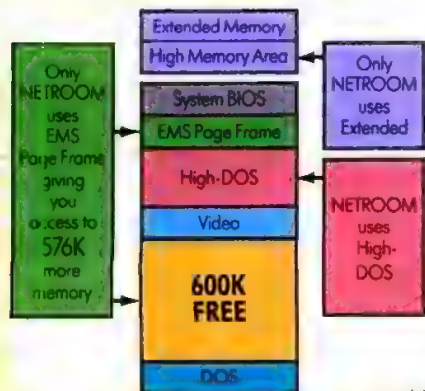


Right!

If you thought the answer is QEMM® or 386MAX®, think again. Because **NETROOM®** just beat them both, by winning PC Magazine's prestigious Editors' Choice award.

PC Magazine said! "With its versatility, this \$149 four-user version rates as a real winner. Considering NETROOM's price and capabilities, you will find that there is no second choice."

What makes **NETROOM** a winner is that it is more than a great LAN manager. It is a full-featured memory manager that not only relocates LANs (like Novell, VINES®, etc.), it also moves device drivers, and TSRs into extended, expanded, and high-DOS memory.



Features:	NET-ROOM	QEMM	386 MAX
Windows 3.0 support	✓	✓	✓
Multituser license	✓		
Converts Ext. to Exp. †	✓	✓	✓
Relocates to High-DOS	✓	✓	✓
Relocates to LIM 3.2 Frame	✓		
Relocates to Expanded	✓		
Relocates to Extended	✓		
Works on 386/486	✓	✓	✓
Works on 8088/286	✓		
Memory Analysis Utility	✓		

And, **NETROOM** is the only memory manager that runs on all PCs (8088 through 80486).

But, there's more...PC Magazine says it's "The most flexible product we tested,"...and..."**NETROOM** uses a unique swapping feature to access data and programs in extended or expanded memory...Even PCs with tightly jammed high-DOS areas can benefit from the memory swapping capabilities of **NETROOM**."

And to top it all off, with **NETROOM** you will get absolutely **FREE - DISCOVER**®, an excellent utility that makes installation a pleasure and provides a detailed, real-time view of the memory configuration and

possibilities within a PC.

PC Magazine says "Netroom's \$149 price for four users is a steal." So, go out and steal yourself a copy!

Available from Helix or at your local dealer.

Requirements: A 386, or some EMS 3.2 or EMS 4.0 memory hardware, or at least 64K ext. memory and DOS 3.3 or greater
†This feature not available on 286 machines.

1-800-451-0551

*Single User, 4 User \$149, 10 User \$249
plus \$5 per order shipping & handling

HELIX SOFTWARE COMPANY

47-09 30th St., Long Island City, NY 11101 (718) 392-3100

Available at **EGGHEAD SOFTWARE**®—call 1-800-Egghead, and at fine dealers everywhere

CIRCLE 313 ON READER SERVICE CARD

© 1991 Helix Software Co., Inc. Netroom, Discover, VINES, QEMM, 386MAX and other mentioned names are registered trademarks of their respective corporations. *Used with permission © 1991 Ziff Davis Communications, Inc.

COMPUADD 320sc:

CompuAdd Makes the Fastest 386SX Faster!

Built-in parallel port and two serial ports

Three 16-bit and two 8-bit expansion slots

Built-in dual IDE hard drive controller

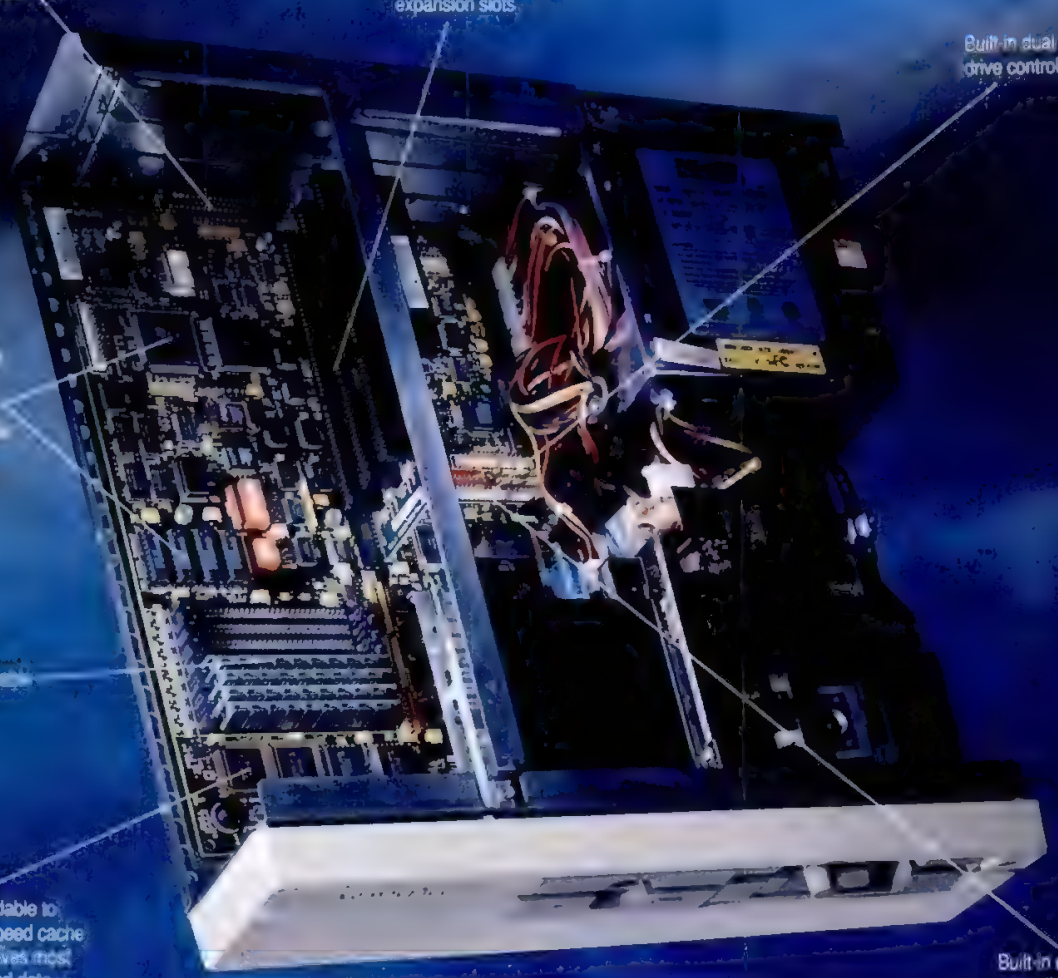
20MHz 386SX microprocessor
2MB DRAM (expandable to 32MB)
20MB hard drive
20MB floppy disk drive
20MB cache memory
20MB cache memory

2MB DRAM (expandable to 32MB)

32KB (expandable to 64KB) high-speed cache memory retrieves most frequently used data at 0 wait-state

20MHz 386SX microprocessor

Built-in dual diskette controller



The Secret? Cache Memory!

\$1295⁶⁶⁷²⁰

The NEW 386SX-based CompuAdd 320sc dramatically boosts throughput speed for vital business projects like spreadsheets and databases! CompuAdd engineers designed a completely new system board that couples a powerful 20MHz Intel® 386SX microprocessor with 32KB high-speed cache memory!

The CompuAdd 320sc zips through memory-intensive applications because the microprocessor retrieves the most frequently used data from

high-speed cache memory rather than from the hard disk.

The new design incorporates CompuAdd's Hi-Rez VGA controller into the system board to deliver video performance worthy of the fastest SX systems! Since the controller is built on the system board, you get incredible high-resolu-



Monitor optional.

tion video without using an expansion slot!

Call toll-free today and find out how affordable our fastest 386SX computers can be!

CompuAdd 320sc

- 386SX rated at 20MHz
- 1MB DRAM expandable to 32MB
- 0 wait-state memory
- 32KB cache memory
- ROM shadowing, EMS LIM 4.0 support and disk caching
- 5.25" 1.2MB or 3.5" 1.44MB high-density diskette drive
- Hi-Rez VGA controller incorporated on system board
- Dual diskette controller
- Dual IDE hard drive interface
- Three full-sized 16-bit and two half-sized 8-bit slots
- One 5.25" and two 3.5" half-height drive bays
- 387SX math coprocessor socket
- One parallel port and two serial ports
- 101-key enhanced keyboard
- Real-time clock/calendar
- 145-watt power supply
- MS-DOS, OS/2, SCO XENIX, UNIX and Novell compatible
- FREE CompuAdd Windows 3.0

CompuAdd 320sc Base System:
\$1295 (66720)

320sc Monitor and Hard Drive Options

	MGA	High-Res. VGA*
40MB	66724 - \$1859	66825 - \$2129
80MB	66725 - \$2129	66826 - \$2399
110MB	66726 - \$2229	66827 - \$2499

* CompuAdd Hi-Rez VGA function incorporated on system board.



Call Today for a Free Catalog!

CompuAdd

Customer driven, by design.

Call 800-456-3660

Key Code 815

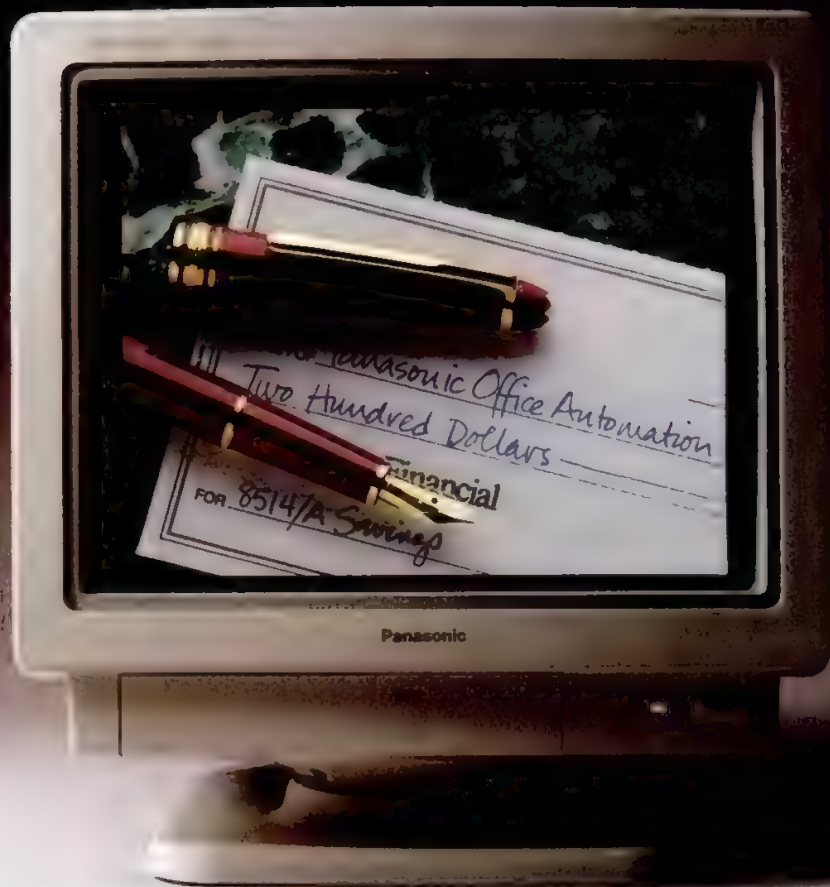
800-387-3266 95-800-010-0401 0600-373535 0130-6009 1-40364949

Hours: Monday - Friday 7:00am to 9:00pm CST; Saturday 9:00am to 5:00pm CST
12303 Technology Blvd. Austin, Texas 78727

© CompuAdd Corporation 1991. We accept MasterCard, VISA, Discover, money orders, certified checks and personal checks (please allow ten days for processing). CODs (\$50 minimum order), company and institutional purchase orders (minimum initial purchase \$500, thereafter \$50), and wire transfers. Please add 2% to all purchases for shipping and handling (minimum \$1), shipping outside the continental United States will increase cost. Add \$10 for shipping and handling to APU, FAX addresses (minimum \$10). Please add appropriate local sales tax. Thirty-day money-back guarantee does not include return freight or shipping and handling. Opened software, videotapes, other consumables and shipping costs are nonrefundable. All return items must be accompanied by a return merchandise authorization (RMA) number. Prices and product descriptions are subject to change without notice. CompuAdd is not liable for damage due to omissions or typographical errors. Call 800-666-1872 for a copy of CompuAdd's complete warranty.

Introducing the PanaSync™ C1381 Monitor

8514/A resolution. VGA® price.



If you want the ultimate VGA graphics standard, and you've resigned yourself to paying a premium of hundreds of dollars to get it, you'll find our newest monitor pleasant viewing indeed.

The PanaSync C1381 gives you a sharp 1024 x 768 pixels, with 0.28 dot pitch. And virtually infinite color resolution.

It's compatible with the most popular VGA boards, as well as analog RGB, MCGA, SuperVGA, and — of course — 8514/A standards.*

It's comfortable in virtually any IBM-compatible or Mac II environment.**

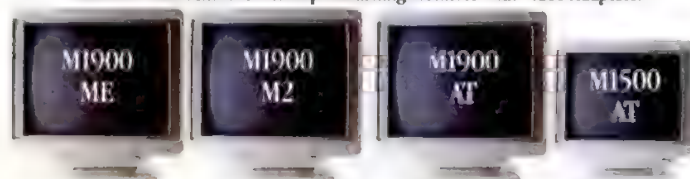
And it's a masterpiece of ergonomics. With front-mounted controls, tilt/swivel stand, plus a non-glare tinted black-matrix screen.

All this at a suggested retail price comparable to many of the ordinary VGA monitors on the market right now. For more information, simply call toll-free 1-800-742-8086.

*Peripherals, Computers, Printers,
Copiers, Typewriters and Facsimiles*

Panasonic
Office Automation 

PanaPro™ Monochrome Desktop Publishing Monitors with Video Adapters.



(Mac SE)

(Mac II)

(IBM XT/AT & PS/2 Model 30)

PanaSync™ Multiscanning Color Monitors.



* VGA, MCGA and 8514/A are trademarks of International Business Machines Corp.

** IBM XT, AT and PS/2 are registered trademarks of International Business Machines Corp. Macintosh is a registered trademark of Apple Computer Inc. An optional cable is required for Macintosh.

by
Cristina Córdova
and Nate Zelnick

New & Improved

News of Announced Products and Upgrades

386SX/20 Notebook Breaks \$2,000 Barrier

NEW For \$1,999 you can now purchase a notebook computer with a 20-MHz 80386SX microprocessor. **Micro Express's** 6.8-pound (battery included) NB5620 features interleaved page-mode memory with 1MB of RAM standard, but add-on cards offer an additional 1MB (\$150) or 4MB (\$450) of RAM. For increased storage capacity, the system's standard 20MB hard disk drive can be replaced by an optional 40MB (\$250) or 60MB (\$350) hard disk drive.

The NB5620 sports a backlit VGA supertwist LCD screen that displays 16 levels of gray at 640-by-480 resolution. It also includes a 3.5-inch 1.44MB floppy disk drive, one parallel and two serial ports, and ports for an external color VGA monitor, an external 5.25-inch floppy disk drive, and an external keyboard. An Intel 80387SX-20 math coprocessor can be easily installed by users via an access panel.



The 6.8-pound ME NB5620 comes with a backlit VGA supertwist LCD screen.

Micro Express claims that the notebook's internal nickel cadmium battery lasts 3 hours—taking 2 hours to recharge when the computer is turned off and 4 hours when it's on.

List Price: Micro Express NB5620, \$1,999. Micro Express, 1801 Carnegie Ave., Santa Ana, CA 92705; 714-852-1400.

CIRCLE 437 ON READER SERVICE CARD

The Ultrathin 386SX is Ultra Light at 4 Lbs.

NEW Commax Technologies claims that its 20-MHz 386SX notebook weighs in at a new low—4 pounds with battery included. Measuring 1.4 by 10.25 by 8.25 inches (HWD), the Ultrathin 386SX offers 4MB of RAM and a 60MB internal hard disk for \$3,895 or a 30MB configuration for \$3,295. Both come standard with a serial port, a parallel port, an external floppy port, an external VGA port, and a 1-pound external 3.5-inch 1.44MB floppy disk. The backlit paper-white VGA LCD features 640-by-480 resolution and 32 gray-scale levels. Commax packages the notebook with DR DOS 5.0 and offers an internal 2,400-bps fax/modem module for an additional \$195. **List Price:** Ultrathin 386SX, 4MB RAM, 30MB hard disk, \$3,295; 60MB hard disk, \$3,895. Commax Technologies Inc., 2031 Concourse Dr., San Jose, CA 95131; 408-435-5000.

CIRCLE 438 ON READER SERVICE CARD

HOT PROSPECT

POWEREDIT EXAMINES DOCUMENTS AT CONTEXT-SENSITIVE LEVEL

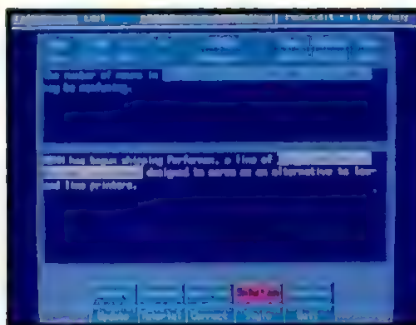
Artificial Linguistics has designed grammatical software to understand words and their relationships to each other. **PowerEdit** acts as a copy editor, by addressing lack of clarity, wordiness, incorrect grammar, and the inability to articulate ideas smoothly.

Combining artificial intelligence with a one million word lexicon, the \$295 **PowerEdit** analyzes text, and spots grammatical errors, including subject-verb agreement, homonyms, and split infinitives. It points out ambiguities, compares word choice, sentence construction and length, and examines slang, acronyms, and foreign words. Constructive comments help with writing errors, and you can determine your degree of deficiency in specific categories as well as request a summary of overall readability. **PowerEdit** analyzes documents of several style types: business, literary, journalistic, and technical. You can also customize it to suit your style.

PowerEdit works directly with **WordPerfect** and **Microsoft Word**, or operates as a standalone product with ASCII files.

List Price: **PowerEdit**, \$295. **Requires:** 12MB of RAM, 470K available hard disk space, and 1,000K extended or expanded memory. Artificial Linguistics Inc., 2301 N. Akard, #200, Dallas, TX 75201; 214-720-7297.

CIRCLE 439 ON READER SERVICE CARD



PowerEdit offers suggestions on how to reword a poorly written sentence.

LiteShow II: Portable Presentation System

NEW In Focus Systems has designed a portable presentation management system for organizing, enhancing, and presenting full-color images on an overhead LCD projection panel. The \$1,995, 4-pound **LiteShow II** captures images at 640-by-480 resolution and displays up to 256 simultaneous colors. It stores as many as 50 computer-generated images on a 3.5-inch floppy disk. You can use additional disks for longer presentations.

The **LiteShow** supports software applications that use DOS, OS/2, **Windows 3.0**, and Macintosh operating systems.

List Price: **LiteShow II**, \$1,995. In Focus Systems Inc., 7770 SW Mohawk St., Tualatin, OR 97062; 503-692-4968.

CIRCLE 440 ON READER SERVICE CARD

nVIEW Supports 4,096-Color Presentations

NEW A new family member of the Editors' Choice-winning **ViewFrame II+2**, **nVIEW's** **ViewFrame Spectra** is a color projection panel whose active-matrix LCD technology yields

CONTINUES ON PAGE 58

BRIEFS



GRAPHICS

Focus Information Systems introduced a high-resolution

Super VGA card that uses Oak Technology's OTI-067 graphics chip set. Priced from \$124, the 2nd Max VGA 6700 board offers memory expandable to 512K, and 1,024-by-768 by 16-color resolution or 800-by-600 and 640-by-480 resolutions with 256 colors. 415-657-4158.

General Business Machines' Mirage II series graphics controller board includes anti-aliasing line drawing capabilities. With 1,024-by-768 resolution, the \$795 board displays up to 800,000 colors simultaneously. 800-228-3349, 213-649-9199.

IDEC has launched the Supervision/16, a \$369.95 video image-capture system. The package consists of a frame grabber board and software for image capture. It allows you to capture an image from any RS-170 source and captures it at 512-by-480 resolution with 256 shades of gray. The Supervision/16 stores the image in a .TIF or .PCX file format. 215-538-2600.

PH6's Super Intelligent VGA graphics controller features password protection and automatic backup of your system's configuration "setup." Variations of the 16-bit board, range in price from \$245 to \$395, and support noninterlaced 1,024-by-768 pixel resolution with 256 colors from a palette of 16.7 million. 213-216-0055.



ANTI-VIRUS

Abacus is shipping *Virus Secure*, a new Windows 3.0 software package designed to eliminate and protect your system from viruses. The \$95 program identifies over 200 known viruses and protects your files from unauthorized changes. 616-698-0330.

POP Computer Products has introduced a virus protection system, the *HardDrive Overlord!*, with three basic functions—scanning, filtering, and authenticating. For \$99.95, the program also provides optional password entry and TSR program management. 303-674-0200.

high contrast colors and brightness. The ViewFrame Spectra is capable of producing 4,096 simultaneous colors, and the projection panel works in conjunction with a standard overhead projector.

List Price: ViewFrame Spectra, \$5,995. nVIEW Corp., 11835 Canon Blvd., Newport News, VA 23606; 804-873-1354.

CIRCLE 440 ON READER SERVICE CARD

20-Inch Screens Display Two Actual-Size Pages

NEW Reaching out from the Macintosh world, **Mirror Technologies** has launched three new PixelView PC large screen displays. Their 20-inch size and 1,280-by-960 resolution enable all three systems to display two full pages of information. And the PixelView PC's virtual desktop feature creates a 2,048-by-1,024 pixel desktop that users can access by hardware panning—rolling the screen to display previously hidden areas.

The \$997 PixelView PC/II is a 1-bit monochrome display. The PixelView PC/IIIH, priced at \$1,297, adds Hercules emulation. And the PixelView PC/IIGS is a \$1,797 4-bit display with VGA emulation, 16 gray scales, and hardware zoom capabilities.

All three displays include a video board, a monitor, a tilt and swivel base, an interface, cables, and Windows 2.x and 3.0 drivers for Real, Standard, and Enhanced modes. While all three systems support DOS and Windows, the PC/II and PC/IIGS also support OS/2. Additional drivers include: AutoCAD, GEM/3, Word 5.0, WordPerfect, and Ventura Publisher.

List Price: PixelView PC/II, \$997; PC/IIIH, \$1,297; PC/IIGS, \$1,797. Mirror Technologies, 2644 Patton Rd., Roseville, MN 55113; 800-654-5294, 612-633-4450.

CIRCLE 441 ON READER SERVICE CARD

MicroChannel Interface For Two-Page Displays

NEW Designed for desktop publishing and Windows 3.0 applications, the Radius TPD/PC-MCA interface enables Micro Channel users to use Radius's 19- and 21-inch two-page display systems.

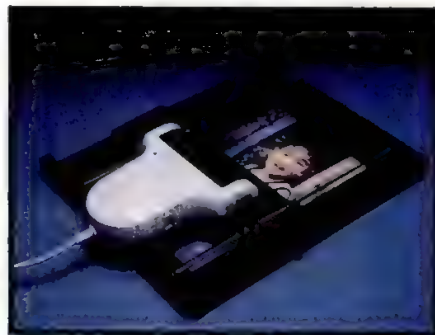
Like the TPD/PC-ISA interface, the MCA version is capable of 1,280-by-960 pixel resolution. In addition, the \$895 graphics adapter features a VGA chip that produces 640-by-480 pixel VGA resolution with 16 levels of gray. The TPD/PC-MCA offers full VGA, MDA, CGA, and Hercules compatibility on one card. The product renders all resolution modes at full-screen size, and they may be switched on the fly.

List Price: TPD/PC-MCA, \$895. Radius Inc., 1710 Fortune Dr., San Jose, CA 95131; 408-434-1010.

CIRCLE 442 ON READER SERVICE CARD

CAT Converter Adds Color Capabilities to Hand-held Scanners

NEW Computer Aided Technology's Color Converter is not just another color scanner or image painter. The \$169 CAT Color Converter brings RGB color to most 4-inch, black-and-white or gray-scale hand-held scanners. Using three color filters, it captures an image



Three passes with your hand scanner and the CAT Color Converter turns gray-scale scans to color.

with three separate scans, and its software integrates them into one full-color image.

With a typical gray-scale scanner, the CAT Color Converter can generate up to 16 million colors, or 256,000 colors with a black-and-white scanner.

After scanning, the Color Converter converts the color images into .PCX or .TIF files in RGB format that can be imported into your paint program. CAT also bundles the product with image processing software.

List Price: CAT Color Converter, \$169. Computer Aided Technology Inc., 10132 Monroe Dr., Dallas, TX 75229; 214-350-0888.

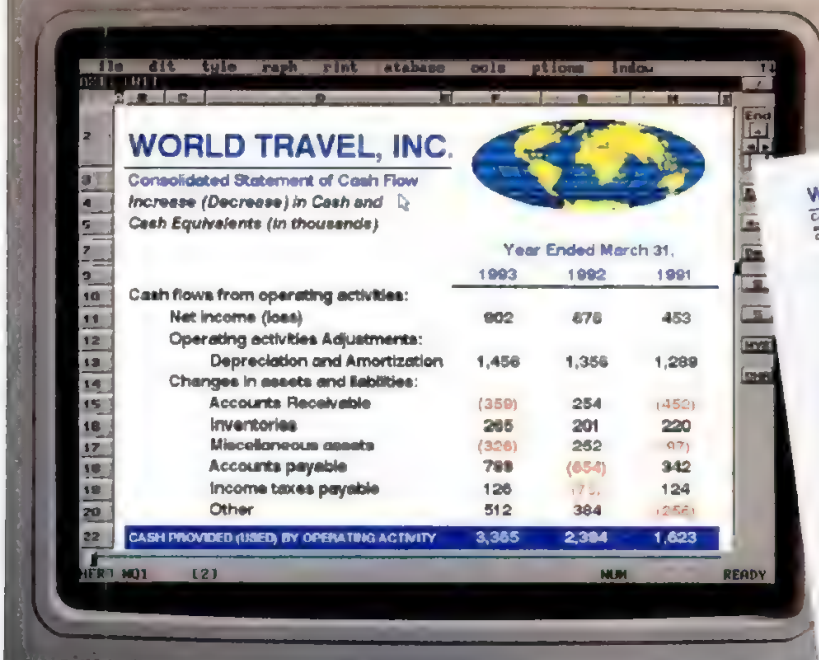
CIRCLE 443 ON READER SERVICE CARD

Driver for 3D Studio Heightens Resolutions

NEW A new protected mode 386 driver from Panacea provides high-resolution support for Autodesk's 3D Studio, as well as AutoShade 2.0 with RenderMan (see "AutoShade Adds Photorealistic Imaging to its Repertoire," First Looks, April 30, 1991). The \$49 PanaRender driver gives 3D Studio users full access to the highest resolutions supported by their display adapters, thereby providing greater detailed renderings.

As shipped, 3D Studio supports a design resolution of 640-by-480 pixels and a rendering resolution of 320-by-200 pixels. PanaRender's VGA version supports all VGAs and Super VGAs including resolutions of 1,024 by 768 by 256 colors and the 32,768 color resolutions that some VGA adapters provide.

CONTINUES ON PAGE 58

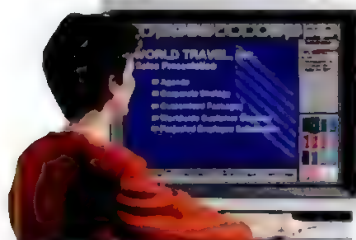


With Quattro Pro's WYSIWYG, what you see onscreen is what you get on paper.

Borland's New Quattro Pro 3.0

WYSIWYG and WYSIWOW!

Quattro® Pro is the hottest spreadsheet on the market. Consistently delivering the best power features: Multiple worksheet consolidation, advanced publishing and 1-2-3® compatibility.



Now Quattro® Pro 3.0 adds WYSIWYG, plus

Choose from a spectacular library of fonts, colors, graphics and clip art to create winning presentations. There's even slide-show sound and transition effects!

Quattro Pro 3.0 beats 1-2-3. Again.

Feature	Quattro Pro	1-2-3 r3.1	1-2-3 r2.2
"Live" editable WYSIWYG spreadsheet	Yes	Yes	No
WYSIWYG page preview	Yes	No	No
Banner (sideways-oriented) printing	Yes	No	No
Print-To-Fit™ automatically on a page	Yes	Yes	No
Backsolver technology built in	Yes	No	No
3-D graphs (ribbon, step, bar, area, pie)	Yes	No	No
Worksheet zoom	Yes	Yes	No
Draw package built in	Yes	Yes	No
Clip art library	Yes	No	No

a theatre full of graphics, publishing and presentation features that will dazzle even the most demanding audience. And, unlike 1-2-3, all of Quattro Pro's features, including WYSIWYG, are seamlessly integrated into one set of menus, greatly enhancing ease-of-use. Just another example of how Quattro Pro's advanced technology is built in... not tacked on.

1-2-3 Users!

Upgrade now for only \$129⁹⁵

Join the more than 3/4 million people who have already switched! And for an additional \$49⁹⁵, you can get ProView,* the ultimate presentation toolkit. Includes 60-day, money-back guarantee. Order today! See your dealer or call now 1-800-331-0877.



New Banner and Print-To-Fit printing options let you print reports your way.

BORLAND

Makers of Paradox®, Quattro® Pro, ObjectVision®, Borland® C++, Turbo C++, Turbo Pascal® and Sidekick®.

CODE: M857

*ProView includes: 100 additional CGM clip art images, 20 professionally designed chart styles, a full color "how to" presentation guide, additional fonts and sounds, plus \$100 worth of 25mm slide service processing. Upgrade pricing in U.S. dollars and good in U.S. and Canada only. Dealer prices may vary. Copyright ©1991 Borland. BI 1401

CIRCLE 287 ON READER SERVICE CARD

BRIEFS



NOTEBOOK PCs

Dell has broadened its portable product line with two new 6.4-pound notebooks. The Dell System 212N, for \$2,399, carries a 12-MHz 80286 CPU and a 20MB IDE hard drive, while the \$3,399 320N sports a 20-MHz 80386SX CPU and a 30MB IDE drive. Both hold up to 5MB RAM. 512-338-4400.

Epson's new 16-MHz 386SX notebook weighs 5.8 pounds. The Epson NB3s is equipped with 1MB of RAM (expandable to 5MB), an internal 1.44MB floppy drive, and either a 20MB, 40MB, or 60MB hard drive. Prices begin at \$3,999. 213-782-5161.

Olivetti has announced three 6.39-pound notebooks, each with a touch-pad mouse integrated into the base unit. The S20 is a 386SX with a 60MB hard drive. The V16 has a 16-MHz 80286 CPU and carries a 40MB drive. And the A12 is a 12-MHz 286 notebook with a 20MB drive. 908-526-8200.

Quill's new 386SX notebook, the Q-Tech Lite, weighs 7 pounds and sells for \$2,279.97. It comes standard with 1MB of RAM (expandable to 5MB), a 20MB hard drive, and a 1.44MB floppy drive. 708-634-6650.



HELP UTILITIES

SXR has announced *Professional Help*, a pop-up help utility for *WordPerfect*. The \$79.95 program uses 6K of RAM to access a half megabyte of information (over 1,000 topics) and provides hypertext-based help and reference. 805-522-5418.

Mentrix has designed a software skills proficiency test for *Lotus 1-2-3*. The *JUDD Test* scores both accuracy and efficiency by posing real tasks for the user. The program retails for \$495; site licenses are \$295 per year. 800-767-5833 or 916-265-4000.

Parsons' Resident Expert for DOS is a hypertext format, on-line reference for DOS users. The \$49 package includes a comprehensive General Topic Index that covers subjects such as error messages, batch files, and DOS editing keys. 319-395-9626.

Panacea offers four versions of *PanaRender*—VGA, 8514/A, XGA, and TIGA. **List Price:** *PanaRender*, \$49. **Requires:** 3D Studio or AutoShade 2.0 with *RenderMan*. Panacea Inc., Londonderry Square, #305, 50 Nashua Rd., Londonderry, NH 03053; 800-729-7420, 603-437-5022.

CIRCLE 444 ON READER SERVICE CARD

Skylight Menu-Builder Replaces The Windows 3.0 Program Manager

NEW VentanaWorks' *Skylight* is a graphical menu builder for *Windows 3.0* that can be used to replace the *Windows Program Manager* with custom front ends and menus.

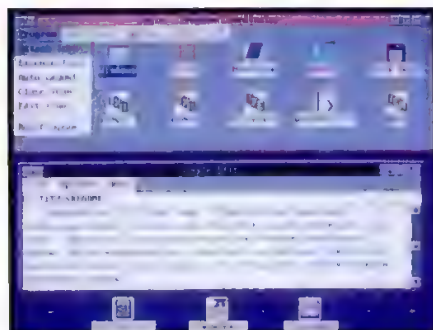
With this \$99.50 utility, you can design a menu or front end with your own combination of bitmaps, icons, pull-down menus, passwords, graphics, and *Windows*-style buttons to serve as your default start-up environment. *Skylight's* bitmap support lets you display any .BMP file anywhere on the screen, and its ability to sensitize specific areas within a menu window allows you to create custom buttons that appear in your windows along with—or instead of—any *Windows*-style buttons. Windows can also be nested to create a menu tree, and passwords secure the menus. **List Price:** *Skylight*, \$99.50. **Requires:** *Windows 3.0*. VentanaWorks, 2111 S. Industrial Park, #108, Tempe, AZ 85282; 602-968-9874.

CIRCLE 446 ON READER SERVICE CARD

TitusDOS: An Icon-Based Menuing System

NEW Non-*Windows* users can enjoy the look and feel of an icon-based GUI without upgrading. **Titus Communications** has designed a graphical user interface for slower desktop and portable computers.

TitusDOS is a menuing system with icons, windows, pull-down menus, and utilities. Users can launch DOS programs with the click of a mouse and return directly to *TitusDOS* upon exiting the application program. The \$49.95 program allows you to perform all routine



The \$49.95 icon-based *TitusDOS* GUI has a desktop editor that imports text files.

functions—including running programs, formatting disks, and desktop utilities—without ever seeing the DOS prompt.

Although it comes with a standard set of 30 icons, *TitusDOS* uses public domain *Windows* .ICO files for icons, so over one thousand icons are available and easy to install. Desktop utilities that come with the package include a calendar, a calculator, an editor, file directories, and a telephone book.

Running at normal speeds, *TitusDOS* consumes 300K of disk space and 16K of RAM during application program operation.

List Price: *TitusDOS*, \$49.95. **Requires:** 512K of RAM, and a hard drive. Titus Communications Corp., 1001 Ross Ave., Dallas, TX 75202; 214-954-0630.

CIRCLE 448 ON READER SERVICE CARD

Text Editor Boasts Simplicity and Utility

NEW Attempting to fill the void left by overly features-rich (and overly complicated) word processors, **Witzend Software** has introduced a simple, compact size, full-screen text editor. The \$39 *Witzend Editor* maintains workspace entirely in RAM and uses standard ASCII formatting.

Although the program is simple, it still offers all of the basic word processing features. The *Witzend Editor* includes pull-down menus, search and replace, word wraps, cut, copy, and paste, box drawing, on-line help, and support for the HP LaserJet. Users can also edit two documents at once using resizable windows.

List Price: *Witzend Editor*, \$39. **Requires:** 85K of RAM, DOS 2.0 or later. Witzend Software, 10810 37th Ave. SW, Seattle, WA 98146; 206-439-9371.

CIRCLE 447 ON READER SERVICE CARD

OS/2 Backup Runs Under Presentation Manager

NEW Designed as a Presentation Manager application, **Irwin Magnetics' OS/2** backup software, *EzTape PM*, gives you complete control over backup sessions. Taking advantage of OS/2's multitasking environment (and multithreading capabilities), *EzTape PM* allows users to launch backup sessions in the background. An integrated library gives on-line access to the directory information from all the tapes and backup sets. Data compression and encryption functions speed up the backup process and protect the data.

List Price: *EzTape PM*, \$329. **Requires:** OS/2 Presentation Manager. Irwin Magnetics Systems, Inc., 2101 Commonwealth Blvd., Ann Arbor, MI 48105-1561; 313-930-9000.

CIRCLE 700 ON READER SERVICE CARD



Make Powerful Connections with Borland's New Paradox

By any standard, Paradox® is the most powerful database. That's why it's been rated #1 by every leading

computer publication, and why hundreds of thousands of users worldwide have switched to Paradox.

Now there's another reason to switch to Paradox—it **connects**.

Now Ready to Connect with SQL

With Paradox® SQL Link (sold separately),* Paradox makes it easy to connect PCs to the networks and SQL servers of your choice.** No programming is required. Users don't need to learn SQL. And since LAN traffic is kept to a minimum, answers to queries are delivered FAST!

All the power and ease-of-use of Paradox now transparently connect with your SQL data, including: Query By Example, multi-table forms and reports, presentation-quality graphics and much more.

Connects with Programmers

Paradox includes a full development language (PAL™) for building complete database applications. And now, with Paradox SQL Link, programmers can integrate SQL statements into PAL programs, use SQL table cursors, trap server error codes, and tap the unique capabilities of different database servers.

Connects with the Full Power of Your PC

Paradox 3.5 incorporates VROOMM™ and Turbo Drive.™ These proprietary Borland technologies let Paradox

CIRCLE 285 ON READER SERVICE CARD

automatically optimize your computer's use of available memory, and access up to 16Mb of RAM on 286/386™/486™ PCs. The result is lightning-fast database performance on *any* PC.

dBASE Owners!

Step Up for Only \$175⁰⁰

At \$795, Paradox is the best database value around. And to introduce its power and speed to dBASE® users, we're making an outrageous offer: If you own any version of dBASE, we'll sell you Paradox 3.5 for only \$175⁰⁰. (Does not include Paradox SQL Link, sold separately.)† Paradox will read and write dBASE files for easy integration into your existing environment.

Upgrade to Paradox 3.5 Now.

See your dealer or call
1-800-331-0877

B O R L A N D

Makers of Paradox®, Quattro® Pro, Turbo C++, Turbo Pascal® and Sidekick®

CODE: ME88

*Paradox SQL Link (\$495 suggested retail) is an add-on product for Paradox 3.5 and is required to make the connection with SQL servers. **Microsoft, IBM, Oracle and DEC RDB/VMS servers supported now. †Offer also good for owners of any version of RBASE or dBase. Proof of ownership (a page from the manual) is required. Satisfaction guaranteed or your money back. Upgrade offer expires May 31, 1991. Upgrade pricing good in U.S. and Canada only. Mail orders to Borland International, Inc., P.O. Box 660001, Scotts Valley, CA 95067-0001. Add \$9.00 for shipping and handling. Residents in CA, CT, GA, IL, MA, MI, MN, NJ, NY, OH, PA, TX, VA and WA, please add appropriate sales tax. For orders outside the U.S. call (408) 438-5300. 386 and 486 are trademarks of Intel Corporation. Copyright ©1991 Borland. All rights reserved. 111395A

Improved

BRIEFS



GRAPHICS

RasterOps Corp. announced that its 24-bit MCA true-color graphics board, the ColorBoard 1024MC (\$4,395), has added Block Mode Transfer hardware to achieve significantly faster area fills, cursor updates, and movement of windows on-screen. 408-562-4200.

Imaging Technology has increased the memory capacity of its 32-bit graphics coprocessor, the VisionPlus-AT Image Processing Accelerator, from 2MB to 8MB (\$5,995) and from 4MB to 16MB (\$7,995). 617-938-8444.

Revolution Software is now shipping a \$20 upgrade to *VGA Dimmer* (\$35.95), which reduces screen burnout in both DOS and Windows. 201-879-8703.



PROGRAMMING

Microsoft has released Version 0.9 of its *Windows Libraries for OS/2 Development Kit* (\$150), an extension to the *Microsoft Windows SDK*, which facilitates the conversion of *Windows* applications to the OS/2 platform. A free upgrade to Version 1.0 will be available upon its release. 800-227-6444.

Six Sigma CASE has added input and output filters (\$145) for *dBASE III+*, *Ingres*, *Oracle*, *Sybase*, and other ANSI SQL programs, and output filters for C declarations, COBOL, and Pascal, to its database design automation tool, the *Canonizer*. 800-669-0842, 206-643-6911

Automation Software Consultants has announced *The Network C Library for NetWare* (\$225 for Microsoft and Turbo C; source code \$225 more). The product provides over 300 features for accessing *NetWare* systems services. 800-669-0842, 513-677-0842.

Solution Systems has enhanced its user-interface development system, *C-Worthy* (\$449, with source code, \$649; upgrades, \$139, with source code, \$199) by adding CUA-compliance, graphics mode support, a message editor, interactive color and new documentation to the system's screen designer, *cwArchitect*. 800-821-2492, 617-431-2313.

ProKey for Windows Records Keystrokes And Mouse Movements

IMPROVED **Rosesoft** has announced *ProKey for Windows*, which automates keystroke and mouse sequences in *Windows 3.0*. The software provides a scripting language that is CUA (common user access) compliant. It allows users to build scripts to load applications, play back keystrokes, and prompt for input.

Rosesoft's DOS version of *ProKey Plus* has added 20 new features and enhancements in Release 5.1. Major additions include: an event scheduler to automate tasks, compatibility with graphics-based applications, user-defined variable looping, improved date and time formats, and changes to the interface to make *ProKey Plus* easier to use.

List Price: *ProKey for Windows*, \$99; for registered *ProKey Plus* users, \$60. *ProKey Plus*, Version 5.1, \$129; upgrades from 5.0, \$20; other upgrades, \$60. **Requires:** *Windows 3.0* (*ProKey for Windows* only), DOS 3.3 or later. **Rosesoft Inc.**, P.O. Box 70337, Bellevue, WA 98007; 206-562-0225.

CIRCLE 448 ON READER SERVICE CARD

Statgraphics Adds Experimental Design Control, Plots

IMPROVED **STSC's** *Statgraphics 5.0* adds experimental design features to its statistical graphics package. These changes offer screening designs and Response surface methods, allowing easier creation and observation of all phases of an experiment from design selection and data entry through data analysis and final output.



Statgraphics 5.0 adds surface and contour graphing, shown here.

New analysis of variance (ANOVA) features include Duncan, Bonferroni, and Newman-Keuls tests. Users may now track the impacts of multifactor variables by adding or deleting interaction terms, including third order

or higher, and choosing the error term to be used for significance tests. Graph capabilities now include surface and contour, square and cube, normal and half-normal probability, and diagnostic residual plots.

List Price: *Statgraphics*, Version 5.0, \$995.

Requires: 640K RAM, DOS 2.0 or later.

STSC Inc., 2115 E. Jefferson St., Rockville, MD 20852; 800-592-0050, 301-984-5123.

CIRCLE 449 ON READER SERVICE CARD

Midrange Volkswriter 4 Adds Grammatik IV

IMPROVED The veteran word processing company **Volkswriter** has upgraded its midrange product, *Volkswriter 4*, Version 2.0, to include: a 170,000-word spell-checker, a 310,000-word thesaurus, page preview, and macros. Reference Software's grammar checker, *Grammatik IV*, has been fully integrated into the word processor, as well as transparent support for *WordPerfect*, *Microsoft Word*, *WordStar*, and Lotus .WK1 file formats.

Volkswriter 4 joins *Volkswriter's* 2 and 6, (an entry-level version and advanced desktop publishing package respectively), to fill out the company's product line.

List Price: *Volkswriter 4*, Version 2.0, \$249; upgrades from Version 1.x, \$50; upgrades from other versions, \$119. **Requires:** 480K, DOS 2.0 or later. **Volkswriter Inc.**, One Lower Ragsdale Dr., Bldg. 2, Ste. 100, Monterey, CA 93940; 408-648-3000.

CIRCLE 450 ON READER SERVICE CARD

Foreign Document Translator Speaks Four Languages Fluently

IMPROVED The *Language Assistant* bidirectional translation series from **Microtac Software** has added a new sentence analysis feature called Translation Assistant. The series, which includes *French*, *Italian*, *German*, and *Spanish Assistant*, contains an on-line version of the Random House bilingual dictionary for each language.

With the Translation Assistant, each program now searches documents, translating words and phrases, conjugating verbs, providing gender and number agreement and correcting word order for each supported language and in English as well. Each package has an editor and can import and translate ASCII files. All tools can be used from within the program or run in a terminate and stay resident (TSR) mode from within any text-based word processor.

List Price: *Language Assistant*, \$79.95.

Requires: 512K, DOS 2.0 or later. **Microtac Software**, 4655 Cass St., Ste. 214, San Diego, CA 92109; 619-272-5700.

CIRCLE 700 ON READER SERVICE CARD

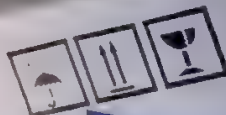
"A SWAN TAKES OFF"

The systems that PC Magazine
raves about can be shipped to
your home or office tomorrow

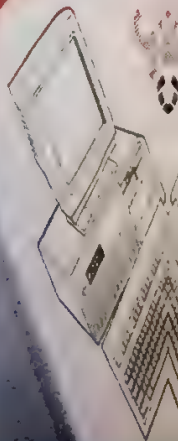


Introducing...

Swan Express



**IMMEDIATE
SHIPMENT**



**Prices Reduced on the
Best-Supported Systems
in the Industry!**

see next
page for details

Call Toll-Free 1-800-468-9044

Introducing...

Why wait 2 or 3 weeks for your new computer?
We will ship it today! **Guaranteed.** Take your pick
from our nine most popular configurations.

Swan

Swan 486/25

- 4MB of 32-bit RAM, expandable to 16MB
- 8K internal cache, 64K secondary cache
- 100MB IDE hard drive—17ms access
- 1.2MB 5.25" and 1.44MB 3.5" floppy drives
- DOS 4.01 installed

NEW LOWER PRICE!

Complete 100MB Monochrome System

\$3495

Swan 386/33

- Intel 80386DX-33™
- 4MB of 32-bit RAM
- 64K of SRAM cache
- 200MB IDE hard drive
- Dual floppy drives
- Swan high-resolution (1024 x 768) video system
- DOS 4.01 installed

NEW LOWER PRICE!

Complete 200MB VGA Color System

\$3395

Swan-Express
configuration...available now!

386/33	VIDEO OPTIONS Include Monitor & Video Adapter			
Drive Options	Mono	14" Flat Mono	VGA Mono	1024 VGA
w/100MB (17ms) IDE	\$2595	\$2645	\$2795	\$2995
w/200MB (16ms) IDE	\$3095	\$3145	\$3295	\$3395
w/330MB (16.5ms) SCSI	\$3695	\$3745	\$3895	\$4095
w/660MB (16.5ms) SCSI	\$4595	\$4645	\$4795	\$4995

Swan 386/25C

- Intel 80386DX-25™
- 4MB of 32-bit RAM expandable to 16MB
- 64K of SRAM cache
- 100MB IDE hard drive—17ms access
- 1.2MB 5.25" and 1.44MB 3.5" floppy drives
- Swan high-resolution (1024 x 768) video system
- DOS 4.01 installed

NEW LOWER PRICE!

Complete 100MB VGA Color System

\$2895

Swan-Express
configuration...available now!

Read What The Industry Experts Have To Say About Swan...

"Swan earned top honors...these ratings mean that Swan managed to make and keep its users happier than any other PC manufacturer."
—PC Magazine, 9/11/90 Service & Reliability Survey



"Swan's 486/25...a great machine at a near mythical price. If someone offers a similar configuration for less, worry about the quality."
—Computer Shopper, 10/90

COMPUTER SHOPPER

"It is well constructed, very expandable, and one of the best 386SX performers we've seen...an exceptional value."
—Computer Buyer's Guide and Handbook

COMPUTER

"Swan's engineers clearly demonstrated that the time of building PC's with whatever parts are cheapest are over."
—Bill Machrone PC Magazine, 9/11/90



"It's faster than other uncached machines I've tested...for the price, Swan's 386/25 offers some of the best performance you can buy."
—PC Sources, 11/90

PC Sources

"The Swan 386/33...a strong recommendation as an ideal home or small office machine."
—PC Magazine, 12/25/90



Swan 386/25

- Intel 80386DX-25™ Norton SI (v4.5): 26.3
- 1MB of 32-bit RAM expandable to 16MB
- 50MB IDE hard drive—17ms access
- 1.2MB 5.25" or 1.44MB 3.5" floppy drive
- High-resolution (720 x 348) mono video system

PRICES REDUCED!

Complete 50MB Monochrome System

\$1695

386/25	VIDEO OPTIONS Include Monitor & Video Adapter			
Drive Options	Mono	14" Flat Mono	VGA Mono	1024 VGA
w/50MB (17ms) IDE	\$1695	\$1745	\$1895	\$2095
w/100MB (17ms) IDE	\$1945	\$1995	\$2145	\$2345
w/200MB (16ms) IDE	\$2445	\$2495	\$2645	\$2845

2MB Performance System

- 2MB RAM, 50MB (17ms) hard drive
- 1024 color VGA • Dual floppy drives
- DOS 4.01 and Windows 3.0 installed
- Swan mouse • Swan mousepad

\$2395

Swan-Express
configuration...available now!

4MB Power System

- 4MB RAM, 100MB (17ms) hard drive
- 1024 color VGA • Dual floppy drives
- DOS 4.01 and Windows 3.0 installed
- Swan mouse • Swan mousepad

\$2695

Swan-Express
configuration...available now!

Swan 286/12

- 80286 12/8 MHz Norton SI 11.7
- 1MB of 16-bit RAM expandable to 8MB
- 40MB IDE hard drive with voice coil
- 1.2MB 5.25" floppy drive
- High-resolution VGA video system
- Small footprint case
- Utilities software
- Enhanced 101-key keyboard

NEW LOWER PRICE!

Complete 40MB VGA Color System

\$1495

1-800-468-9044

Express



"Swan has done a nice job of balancing quality components, comprehensive support and highly competitive pricing."

—PC Sources
11/90

Swan 386SX

- Intel 80386SX-16™
Norton SI (v4.5): 17.3
- Novell Labs tested and approved
- 1MB of 16-bit RAM expandable to 8MB
- 50MB IDE hard drive—17 ms access
- 1.2MB 5.25" or 1.44MB 3.5" floppy drive
- High-resolution (720 x 348) mono video system

PRICES REDUCED!

Complete 50MB Monochrome System

\$1295

386SX/16	VIDEO OPTIONS Include Monitor & Video Adapter			
	Mono	14" Flat Mono	VGA Mono	1024 VGA
Drive Options				
w/50MB (17ms) IDE	\$1295	\$1345	\$1495	\$1695
w/100MB (17ms) IDE	\$1545	\$1595	\$1745	\$1945
w/200MB (16ms) IDE	\$2045	\$2095	\$2245	\$2445

2MB Performance System

- 2MB RAM, 50MB (17ms) hard drive
- 1024 color VGA • Dual floppy drives
- DOS 4.01 and Windows 3.0 installed
- Swan mouse • Swan mousepad

\$2049

Swan Express
configuration...available now!

4MB Power System

- 4MB RAM, 100MB (17ms) hard drive
- 1024 color VGA • Dual floppy drives
- DOS 4.01 and Windows 3.0 installed
- Swan mouse • Swan mousepad

\$2395

Swan Express
configuration...available now!

Call for details on our 20MHz 386SX!

Swan XT10

- 10/4.77 MHz 8088-1
- 640K RAM
- 32MB hard drive—40ms access
- 360K floppy drive
- High-resolution (720 x 348) mono video system
- 150W Power Supply
- 640K RAM
- Enhanced 101-key keyboard
- Recipient of Computer Shopper's 1990 Best Buy award

Complete 32MB Monochrome System

\$925

S=E1A4



The systems marked with our Swan Express symbol



have been built, thoroughly tested, packed and are ready to be shipped to you today.

Swan Express Guarantee

If we are unable to ship your credit-approved order for one of the Swan Express configurations on the same day, we will pay the shipping fee.*

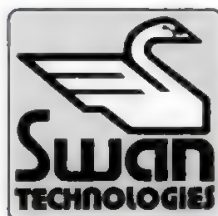
* Guarantee only applies to orders for one of the nine configurations listed while they remain in stock; credit-approved orders accepted weekdays prior to 3pm EST.



2-Year Warranty With Free On-Site Service

Don't settle for half the coverage. We understand the importance of keeping your computer up and running, not just for the first year, but long after. Our devotion to quality manufacturing plus years of experience have enabled us to double the warranty on all Swan 286, 386, and 486 systems. We use only the finest components from companies such as Quantum, Sony, Conner and Intel, which has substantially increased the reliability level of Swan systems. We are extending that confidence to you with a warranty that is twice as long as most computer companies offer.

The Swan 2-year warranty includes free field service, which is provided by TRW, with over 200 service centers nationwide.



"Acknowledging that mail-order customers are seeking improved service and support from every manufacturer, Swan Technologies is doubling the warranty and on-site service period on its PCs and monitors."

—PC Sources, 3/91

PC Sources

1-800-468-9044

Peripherals



Monitors

Swan VGA 15

Our professional multiscanning monitor features non-interlaced 1024 x 768 resolution and a 15" anti-glare screen. It accepts both analog and digital input. Other features include .31mm dot pitch, auto screen sizing and tilt/swivel base.

\$599

Swan 1024 VGA

\$399

Swan TTL Monochrome

\$89

Video Cards

New! Swan VGA Palette Plus

Delivers 32,763 colors from a palette of 16,700,000! With 1MB, the Palette Plus supports resolutions up to 1024 x 768 non-interlaced. Includes drivers for WordPerfect 5.1, AutoCAD, 8514/A, plus HiColor™ drivers for Windows 3.0.

\$249

Swan 1024 VGA Card

Superior clarity and fantastic colors of non-interlaced 1024 x 768 resolution.

w/ 1MB

\$199

w/ 512K

\$159

w/ 256K

\$129

New! Swan Spectrum VGA

This 16-bit card supports 640 x 480 resolution with 16 colors.

\$69

Modems

Swan 9600 Baud Modem

Ideal for high-volume, high-speed transmissions. Supports the v.42 standard for error-free communication.

\$429

2400 Bd MNP Int/Ext

\$99/\$129

2400 Bd Int/Ext

\$75/\$99

Tape Backups

New! Swan 700MB Tape Backup

Fast, cost-effective high-capacity data storage, with data transfer rates of up to 12MB per minute. Features software data compression, Novell compatibility plus expanded memory support. Requires data compression card.

Internal/External \$799/\$999

Swan 250MB Tape Backup

Internal/External \$319/\$419

Swan 120MB Tape Backup

Internal/External \$249/\$349

New! Swan SendFAX

Now you can send faxes directly from your PC to any Group III compatible fax machine or PC Fax at 9600bps. The Hayes compatible modem communicates at 2400, 1200, and 300 bps. Includes BitCom software.

\$109

New! Swan Elite Keyboard

This keyboard offers 130 keys, built-in calculator, eight arrow keys and a turbo key.

\$99



Two year Warranty With Free On-site Service†

Don't settle for half the coverage. We understand the importance of keeping your computer up and running, not just for the first year, but long after. Field service is provided by TRW, a leader in computer maintenance, with over 200 service centers nationwide.

†additional mileage charges may apply



30-Day Money-Back Guarantee

If, for any reason, you're not satisfied with any Swan brand product, return it within 30 days for a refund.



Quick On-Line Shopping

Swan OnLine is being extended to include product information and order taking capability.



Special Programs for Corporate & Education Customers

A special, dedicated sales team serves the unique needs of our growing base of corporate and education customers.

Swan Now On GSA Schedule

Government customers can call our government hotline 800-533-1131 toll-free for information on GSA approved pricing for Swan products.



Technical Support Is Open Every Day

Our award winning Technical Support is now available every day, 365 days a year. Our Tech Support is open: Mon-Fri 9am to 9pm, Sat and Sun 9am to 5pm EST.



Direct Access to Tech Support

Just call 800-468-7926 toll free for direct connection to Swan's Tech Support Department.

Mon-Fri: 8am to 11pm
Sat: 10am to 8pm
Sun: 12pm to 8pm EST

Call For Your Free Catalog



No surcharge on credit card orders. • Your card is not charged until your order is shipped. • Software or accessories orders over \$100 and under 6 lbs will be shipped Federal Express. • Orders for in-stock items received before 3 pm EST will be shipped same day...and each order is insured at no cost to you! • 3% or \$5 minimum for UPS Ground. Call for shipping charges on Express Air, APO, FPO, AK, HI and all foreign orders. • If part of your order is backordered, the remainder will be shipped UPS Ground. • Allow 2 weeks for all checks to clear. • ALL SALES (except Swan products) ARE FINAL. Items returned must be as-new, without modification or damage. All warranty cards, manuals, and packaging material must be included. Return shipping must be pre-paid and insured, bearing an RA* on the shipping label. • Shipping and upgrade fees are non-refundable. • Defective items replaced or repaired at our discretion. • PA deliveries add 6% sales tax. • Prices & terms subject to change without notice. • Products may differ from photos. • TRW service available for continental U.S., Puerto Rico and Hawaii—additional mileage charges may apply.



3075 Research Drive
State College, PA 16801

S=E1A4

1-800-468-9044

CIRCLE 268 ON READER SERVICE CARD

"I wave the Swan flag... these people are great when it comes to making things work for the customer."

—Daniel Morgan,
PC Magazine
9/25/90

edited by
Matthew J. Ross

Read Only

Reviews of the Latest Books for the PC User

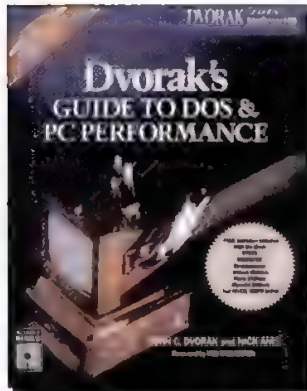
More Power to Your PC

■ *Dvorak's Guide to DOS & PC Performance*

by John C. Dvorak and Nick Anis
Osborne/McGraw-Hill, \$49.95
John C. Dvorak and Nick Anis' 950-page tome is a considerable undertaking, and thanks at the beginning of the book have the breadth of the production notes to the five-year-in-the-making Ken Burns/PBS Civil War series. While a committee approach certainly went into writing this book, it is peppered with the same spice Dvorak brings to his magazine columns, and has the definite Dvorak flavor with his advanced tips and techniques dedicated to enhancing PC performance.

Like all comprehensive everything-you'll-ever-need-to-know books, *Dvorak's Guide to DOS & PC Performance* quickly serves up the basics, as well as large portions of PC operating system and technology history. If not for the highlighted "READ.ME's" that are found throughout the book, readers might be overwhelmed by the relentless pages of information. The book suffers at times from uninspired page design and typographic treatment, the worst examples being Chapter 2's inscrutable DOS Command Reference and the DOS Quick Reference table.

The authors *do* make it easy on the reader by highlighting products. When they talk about DOS shells and menuing, data protection and recovery, disk caching, backup, windowing, and memory management programs, Dvorak and Anis



Dvorak's DOS guide combines expert advice with a host of software utilities for improved PC productivity.

name names and give you addresses and phone numbers—including hardware where applicable. Other operating systems (including DR DOS 5.0, Concurrent DOS, OS/2, and even Unix) are covered appropriately by examining their DOS compatibility.

Diagnostic software is covered intelligently, again with the bent of getting the best PC performance for the buck. The chapters on EDLIN, Debug, and batch files are straightforward, and all focus on making your PC work up to its capability. And for all of us waiting to bypass DOS 4.x, a number of significant features of the yet unreleased Microsoft DOS 5.0 are detailed.

But the people who read Dvorak in *PC Magazine* have come to expect the inside track on products. Dvorak's guide delivers the goods with a collection of shareware, custom-written software, and special-issue commercial programs representing more than 70 utilities: disk caching, file compression, file and hard disk management, system

scanning, TSRs, text editors, and special editions of the XTree and Mace utilities—all compressed onto two low-density disks.—**Greg Pastrick**
Osborne/McGraw-Hill, Berkeley, CA 94710; 415-548-2805.
ISBN: 0-07-881658-0

CIRCLE 396 ON READER SERVICE CARD

■ *The Personal Computer Book*

by Peter McWilliams
Prelude Press, \$19.95
Peter McWilliams was the best-selling author during the early 1980s when many were desperately seeking plain-English explanations of what personal computing was all about. The early editions of *The Personal Computer Book* charmed many with their woodcut illustrations and gentle humor. McWilliams' new edition, the first since 1984, is a fine introduction to PCs that has been "completely revised for the 1990s."

McWilliams' two purposes are to inform and to entertain. *The Personal Computer Book* remains at an intentionally general level, often stressing that most people need only a limited amount of deeply technical information about computers. The author suggests that whenever you start to get bored, skip that section and go on because it probably covers information you don't need anyway.

The parts of a PC are explained on an overview level only, so this is definitely not the book in which to seek the relative merits of SCSI and ESDI drive controller technology. McWilliams examines the use of PCs in business, with separate chapters for major applications groups. His books have always stressed that word processing is the most common use of

computers, and this is no exception: Ten chapters are devoted to word processing in business, schools, and for professional writers.

A second topic that gets lots of attention is the six-chapter section entitled "Personal Computers and the Disabled." McWilliams relates real-world case studies and references specific sources of technology and software that help the disabled lead fuller lives through using computers. This marvelous section alone is worth the price of the book.

Entertainment in *The Personal Computer Book* is constant and spread throughout the informative sections. Several sections are just for fun, such as "Utter Nonsense: The McWilliams II Word Processor Instruction Manual," a hilarious 133-page digression on using the pencil as a word processor, complete with operating instructions, and a tribute to Joan Crawford.

There are a few small errors in the book. McWilliams incorrectly defines DRAM as memory that maintains information when the power is turned off (it doesn't), and he claims that IBM entered the personal computer world in 1983 (it was really August, 1981).

If you take computers very seriously, you should avoid *The Personal Computer Book*. If, however, you want some fun reading about computers and their uses, it's a great beginning.—**Bruce Brown** ■
Prelude Press, Los Angeles, CA 90046; 800-LIFE-101.
ISBN 0-931580-30-7

CIRCLE 397 ON READER SERVICE CARD

SAME-DAY SHIPPING GETS YOU STARTED FASTER!



Solid Reputation! Above Average Service & Support!

"The ACMA 486/33 Engineering Workstation is a fairly priced system from a vendor with a solid reputation and above-average service and support policies. Acma tied for first place in Conventional Memory tests and "...earned the second-highest score on the Instruction Mix test."

Call For
GSA
Pricing!



286/12

- 80286/12MHz CPU
- 1MB RAM expandable to 4MB
- 1.2MB or 1.44MB floppy
- 40MB IDE hard drive (18ms)
- Monochrome monitor & Hercules compatible mono-graphics card
- 2 serial, 1 parallel & 1 game port
- 101 enhanced keyboard
- MS-DOS 4.01
- MS-DOS & OS/2, Unix, Xenix, & Novell compatible

\$995

386/SX 16 & 20

- Intel 80386SX-16 or 20MHz CPU
- 4MB RAM expandable to 8MB on motherboard (1MB on SX-16MHz)
- 1.2MB & 1.44MB floppy drives
- 40MB IDE hard drive (18ms)
- 14" Super VGA color monitor (1024x768, .28 dot pitch)
- 16-bit VGA card with 512K RAM
- 2 serial, 1 parallel & 1 game port
- 101 enhanced keyboard
- Windows 3.0 & Mouse
- MS-DOS 4.01
- MS-DOS & OS/2, Unix, Xenix & Novell compatible

16MHz \$1,595

20MHz \$1,995

386/25

- Intel 80386/25MHz CPU
- 4MB RAM expandable to 8MB on motherboard
- 1.2MB & 1.44MB floppy drives
- 80MB IDE hard drive (19ms)
- 14" Super VGA color monitor (1024x768, .28 dot pitch)
- 16-bit VGA card with 1MB RAM & 256 colors at 1024x768
- 2 serial, 1 parallel & 1 game port
- 101 enhanced keyboard
- 1 year TRW on-site service
- Windows 3.0 & Mouse
- MS-DOS 4.01
- MS-DOS & OS/2, Unix, Xenix & Novell compatible

\$2,395

486EISA 25&33

- Intel 80486/25 or 33MHz CPU
- 4MB RAM expandable to 64MB on motherboard
- 256K Cache
- 1.2MB & 1.44MB floppy drives
- 150MB ESDI hard drive (18ms)
- ESDI/EISA controller
- 14" Super VGA color monitor (1024x768, .28 dot pitch)
- 16-bit VGA card with 1MB RAM & 256 colors at 1024x768
- Built-in math coprocessor & Weitek 4167 support
- 2 serial, 1 parallel, 1 game port
- 101 enhanced keyboard
- 1 year TRW on-site service
- Windows 3.0 & Mouse
- MS-DOS 4.01
- MS-DOS & OS/2, Unix, Xenix & Novell compatible

25MHz \$5,195

33MHz \$5,995

486ISA 25&33

- Intel 80486/25 or 33MHz CPU
- 4MB RAM expandable to 16MB on motherboard
- Cache: 33MHz-256K, 25MHz-64K
- 1.2MB & 1.44MB floppy drives
- 210MB IDE hard drive (18ms)
- 14" Super VGA color monitor (1024x768, .28 dot pitch)
- 16-bit VGA card with 1MB RAM & 256 colors at 1025x768
- Built-in math coprocessor & Weitek 4167 support
- 2 serial, 1 parallel & 1 game port
- 101 enhanced keyboard
- 1 year TRW on-site service
- Windows 3.0 & Mouse
- MS-DOS 4.01
- MS-DOS & OS/2, Unix, Xenix & Novell compatible

25MHz \$3,595

33MHz \$4,350

386/33

- Intel 80386/33MHz CPU
- 4MB RAM expandable to 8MB on motherboard
- 64K Cache
- 1.2MB & 1.44MB floppy drives
- 80MB IDE hard drive (19ms)
- 14" Super VGA color monitor (1024x768, .28 dot pitch)
- 16-bit VGA card with 1MB RAM & 256 colors at 1024x768
- 2 serial, 1 parallel & 1 game port
- 101 enhanced keyboard
- 1 year TRW on-site service
- Windows 3.0 & Mouse
- MS-DOS 4.01
- MS-DOS & OS/2, Unix, Xenix & Novell compatible

\$2,595



FEATURES & SERVICES

- 45-Day money-back guarantee.
- **FREE** Microsoft® Windows™ 3.0 & Mouse with 386 & 486 systems.
- **FREE** Microsoft® DOS 4.01
- Windows and/or DOS preloaded for you!
- Same-day shipping for standard (as listed) configurations ordered before 2pm EST.
- **FREE** 1 year TRW on-site service for 386 & 486 computers in most U.S. locations.
- **FREE** lifetime toll-free technical support.
- Leasing available for qualified businesses.
- New longer hours: 8am-10pm M-F & 11am-7pm Saturdays EST.
- Hearing impaired TDD 800-456-8901
- Call for GSA Pricing!

BEST
BUY!

100% Satisfaction Guaranteed!
Call Toll-Free 800-456-1818

New Longer Hours: 8am-10pm M-F & 11am-7pm Sat. (Eastern Time)

COMPUTERS, INC.
Acma



Always The Best Quality And Value!

All prices and specifications are subject to change without notice. 117 Fourier Avenue, Fremont, CA 94539 (415) 623-1212 (415) 623-0818 Fax

by
Gus Venditto

Pipeline

A Look at the Trends Shaping the Personal Computer Market

IBM's New Strategy for Word Processing Looks Beyond DisplayWrite

When IBM created its desktop software division, the company's goal was to win a strong position in the mainstream PC software market.

Until then, with the exception of PC-DOS, IBM had a significant market share only in word processing, and even there *DisplayWrite*'s modest market share was eroding.

The IBM strategy has yet to win any ground; the critically acclaimed launch of *Current* and a multimedia-inspired relaunch of *Storyboard* showed innovative thinking, but neither product has succeeded in capturing the popular imagination.

The division is just getting started, however. Its boldest hand

yet will be played in coming months.

Recognizing that *DisplayWrite* is never going to recover the ground it has lost over the years to *WordPerfect* and *Microsoft Word*, IBM is going to start fresh in the word processing market.

Its next offering will be *Signature*, a full-featured word processor that will be an outgrowth of *XyWrite*, the quirky word processor that has a reputation for bullet-like speed and an idiosyncratic command structure.

Signature will be released for DOS in coming months, and soon after *Windows* and *OS/2* versions will ship. All versions will share the same commands and

menu structure. Each version will have scroll arrows running along the borders, and will incorporate a DOS-like command line where you can type mnemonic commands. Pull-down menus will let you access the same commands with a mouse.

IBM is taking pains to say that it will not abandon *DisplayWrite* users—that performance upgrades will be released. And *Signature* will make small concessions to *DisplayWrite* users: It will read *DisplayWrite* files and will incorporate stop codes into its design.

But the writing is on the wall: the future doesn't belong to *DisplayWrite*.

For *XyQuest*—the small company that created *XyWrite* for companies that replaced Atex systems with PCs—being chosen by IBM is like winning the lottery. *XyQuest* doesn't have the resources to compete with Microsoft or WordPerfect, even

with a small, loyal following (a following that includes *PC Magazine* and many other publications).

For IBM, licensing *XyQuest*'s word processing technology is a second chance not just to gain modest market share but to take the biggest slice.

The greatest weakness of the current crop of graphical word processors is display speed. In picking *XyWrite*, IBM has gotten its hands on one of the fastest engines yet built for word processing.

Sierra and Broderbund Merge to Better Wage the Battles Ahead

Two pioneers in recreational software—Sierra On-Line and Broderbund—have found that growing in today's competitive market is going to require more than clever ideas. The two are merging, even though both have

CONTINUES ON PAGE 69



MAGNET SURVEY

If there's one thing that makes a software publisher crazy, it's printer support. Even though the HP LaserJet has become today's leader in sales and graphics compatibility, there are dozens of printer emulations still in use. As PC Magazine Labs begins to plan this year's roundup of printers (the No-

vember 26 issue), a survey of PC MagNet callers confirmed that laser printers are standing tall in a sea of printing technologies. 95 percent of the 1,798 respondents said laser printers were in use within their companies, but only 6 percent said that laser printers were the only printers installed.

Are there any printers besides laser printers installed in your company?



Which types of nonlaser printers are being used in your company?



Screaming 1-year-old rattles industry.

The IBM RISC System/6000 family keeps delivering performance that's positively hyperactive.

Talk about precocious. Just a little over one year ago, when we proudly announced the arrival of the RISC System/6000™ POWERstations and POWERservers, they were already way ahead of the other kids in their class, delivering amazingly high performance for their diminutive price range.

	Hardware Price	MFLOPS	SPECmarks™
POWERstation 320H	\$17,972	11.7	32.4
SPARCstation 2	\$14,995	4.2	21.0
DECstation 5000	\$19,395	3.7	18.5

Now, we're introducing the new RISC System/6000 POWERstation 320H. It runs 11.7 MFLOPS* and 32.4 SPECmarks*. If you already have the original POWERstation 320, you can upgrade it now to the even more spectacular performance of the 320H.

YET ANOTHER NEW ADDITION TO THE FAMILY.

Our POWERserver 950 is also brand spanking new. It gives you the performance of the POWERserver 550—25.2 MFLOPS and a SPECmark of 56.3—but in a rack-mounted system, to share more disk storage, power and expandability with others. And all the models in the UNIX®-based RISC System/6000 family can now add disk expansion units for up to quadruple their previous maximum fixed disk storage. This yields up to 22.2GB on the POWERserver 950.

A NEW BOX OF CRAYONS.

Then there's the POWERgraphics GTO graphics subsystem. It can attach to any model in the RISC System/6000 family, to deliver super graphics performance previously available only in the

POWERstation 730—990,000 3D vectors/second and 120,000 shaded polygons/second.

MEMORY AT PRICES THAT WON'T CAUSE TANTRUMS.

And now you can get more memory for less. The more memory you buy, and the bigger the increments, the less you pay per MB. After all, just because we're a year old doesn't mean we don't know the value of money. Especially yours.

To find out more about the RISC System/6000 family, call 1 800 IBM-6676, ext. 878. And if you think this one-year-old is a handful now, just wait until the terrible twos.

For the Power Seeker.



*SPECmark is a geometric mean of the ten SPECmark tests. MFLOPS are LINPACK double precision where n=100. AIX XL FORTRAN Version 2.1 and AIX XL C Version 1.1 compilers were used for these tests.

IBM and AIX are registered trademarks and RISC System/6000 is a trademark of International Business Machines Corporation. UNIX is a registered trademark of UNIX Systems Laboratories, Inc. SPECmark is a trademark of Standard Performance Evaluation Corporation. HAGAR THE HORRIBLE Character(s) © 1991 King Features Syndicate, Inc. © 1991 IBM Corp.

IBM

Pipeline

CONTINUED FROM PAGE 67

been very successful in recent years.

Sierra, with *Leisure Suit Larry* and *King's Quest*, has been one of the leaders in adult games; Broderbund has been successful with children's programs, including *The New Print Shop* and the *Carmen Sandiego* series.

Both are faced with growing competition from Walt Disney Software, which has already entered the children's market and will be introducing games for teenagers in coming months.

And recreational software will soon see its biggest challenge yet, as inexpensive PCs with on-board MIDI and CD-ROM-based software are released.

Original works like *Carmen Sandiego* will be competing with colorful CD-ROM-based encyclopedias that generate music and sound effects.

The two companies are ideally suited for such a joint effort since their product lines are not directly competitive. The merger will not affect the types of products developed in each line.

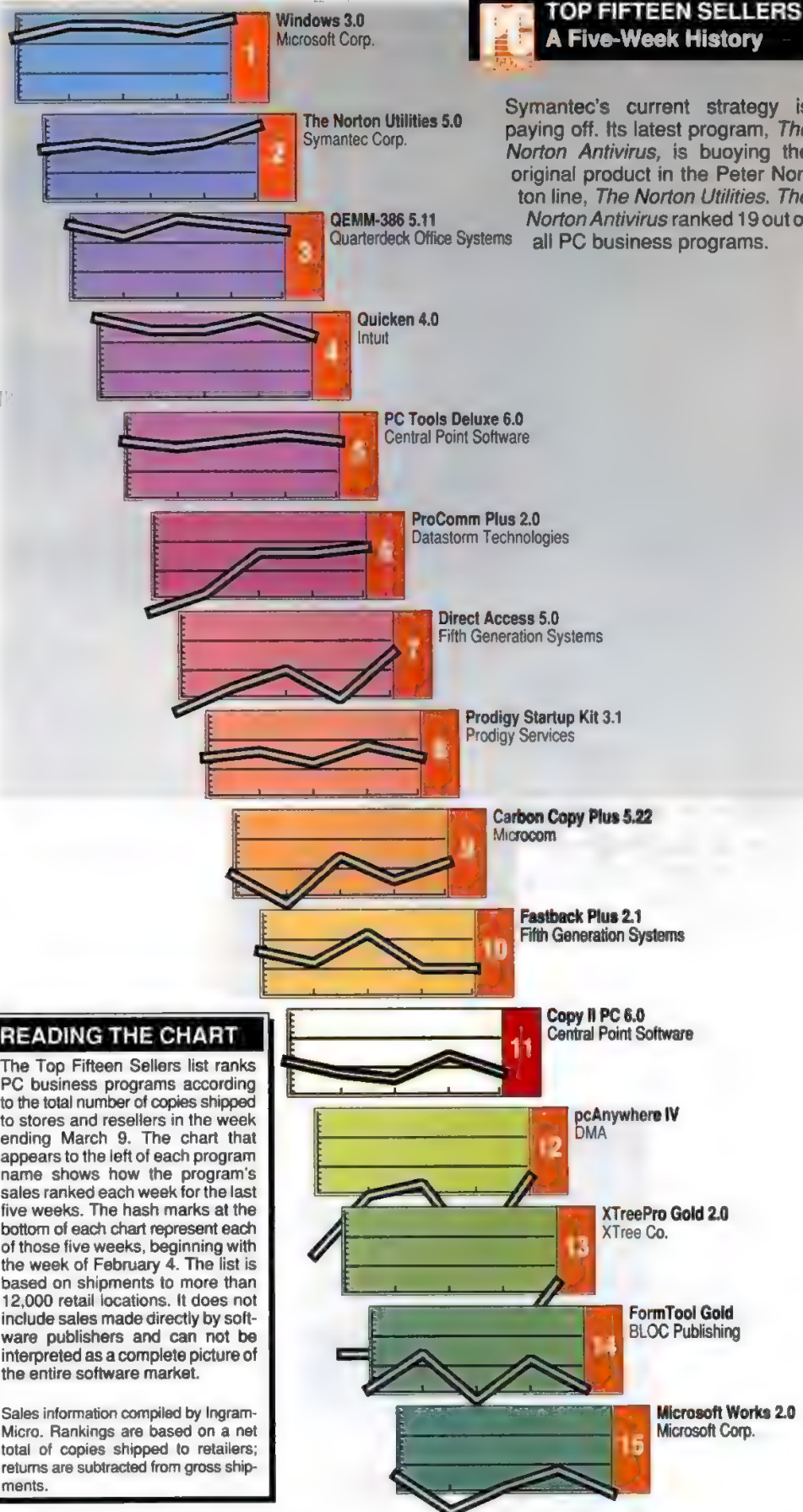
Laptop Rentals Begin at Some Airports

Here's help for people who have trouble borrowing a laptop from the office pool.

LapStop, a Salem, Mass., company, has started daily rentals of Zenith SupersPorts and Diconix ink jet printers at a growing number of airports in the East. Counters are open near the gates at the Trump Shuttle in New York-La Guardia, Washington-National and Boston-Logan airports; and at six Avis airport locations, including Chicago O'Hare and Newark.

The rentals are not cheap—they start at \$44.95, with additional charges for a 386, extra memory or a larger hard disk. All rentals include a modem, carrying case, and battery pack. The company recommends that you call in advance for a special configuration.

LapStop plans to add counters at 15 more Avis offices by the end of the year.



Symantec's current strategy is paying off. Its latest program, *The Norton Antivirus*, is buoying the original product in the Peter Norton line, *The Norton Utilities*. *The Norton Antivirus* ranked 19 out of all PC business programs.

Serving the
computer world
since 1984

CompUSER

COMPUDYNE 286-16



80286, 16MHz
1MB, 0 wait state
1.2 MB 5¼" Drive
IDE HD controller
101 keyboard
8 expansion slots

\$459

1-year warranty 12" Amber 14" VGA Color
720x350 .41 dp 640x480

40MB 28ms	\$799	\$1019
89MB 19ms	\$939	\$1159
124MB 19ms	\$1039	\$1259
211MB 15ms	\$1299	\$1519

Video Card Included! Fully Tested!

COMPUDYNE 386SX-16



80386SX, 16MHz
1MB, 0 wait state
1.2 MB 5¼" Drive
IDE HD controller
101 keyboard
7 expansion slots

\$629

1-year warranty 12" Amber 14" VGA Color
720x350 .41 dp 640x480

40MB 28ms	\$969	\$1189
89MB 19ms	\$1109	\$1329
124MB 19ms	\$1209	\$1439
211MB 15ms	\$1469	\$1689

Video Card Included! Fully Tested!

COMPUDYNE 386-25C



80386, 25MHz
1 MB, 32K cache
1.2 MB 5¼" Drive
IDE HD controller
101 keyboard
7 expansion slots

\$1059

1-year warranty 12" VGA White 14" VGA Color
640x480 .41 dp 640x480

40MB 28ms	\$1489	\$1619
89MB 19ms	\$1629	\$1759
124MB 19ms	\$1729	\$1859
211MB 15ms	\$1989	\$2119

Video Card Included! Fully Tested!

386SX-16 System

Graphics Cards

Printers With Free Cables!

Leading TECHNOLOGY 386SX-16

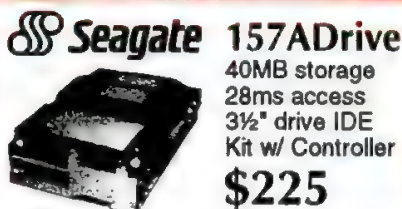


80386SX, 16MHz, CD ROM w/
software, 1MB RAM, 5¼" and 3½"
drives, 40 MB hard drive, Hyper
DOS, .41 VGA color monitor and
card, Lotus Works Software, 1 year
on-site warranty, (no substitutions)

\$1799⁰⁰

Compudyne VGA 640 x 480	\$65
VGA 1024 x 768	\$89
ATI BasicVGA 16	\$75
VGAWonder 256 Plus	\$179
Sigma VGA Legend 1MB	\$239
Suntek MGP III Mono	\$25
Leading Tech CGA Color	\$25

Storage Devices



Seagate 157ADrive

40MB storage
28ms access
3½" drive IDE
Kit w/ Controller

\$225

Seagate ST157A Drive Only ..	\$219
ST1102A 89MB IDE	\$359
ST1144A 124MB IDE	\$459
ST1239A 211MB IDE	\$719

Plus Development 80 MB	
Hardcard II	\$459
150 MB Hardcard II	\$609
Quantum/Impulse LP 105	
100MB AT	\$459
LP 210 200MB AT	\$749
SC 210 200MB SCSI	\$729

Floppy Drives

Compudyne 5¼" ext.	\$199
Sony 3½" 720K	\$55
3½" 1.44MB	\$62
Toshiba 5¼" 1.2MB	\$62

Tape Backups

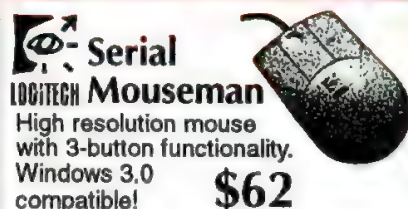
Compudyne 60MB Int	\$229
120MB Int.	\$319

Canon BJ10e Bubblejet	\$299
Epson LX810 9-pin	\$169
LQ510 24-pin 80 col.	\$249
LQ1010 24-pin 132 col.	\$369
LQ2550	\$869
NEC P3200 24-pin 80 col.	\$259
P3300 24-pin 136 col.	\$369
Panasonic KX-P1180	\$147
KX-P1124 24 pin 80 col.	\$249
KX-P1624 24 pin 136 col.	\$349
KX-P1123	\$225
TI microLaser PS17	\$1199
MicroLaser PS35	\$1499
Seiko Label Printer	\$159

Joysticks

C&H Flight Stick	\$39
Quikshot Gamecard	\$12
QS123	\$10

Mice/Trackballs



Serial Mouseman

High resolution mouse
with 3-button functionality.
Windows 3.0
compatible!

\$62

Chicony 5581 101 w/Trackball ..	\$69
Logitech Trackman Serial	\$75
Marstek Serial Mouse E22	\$19
Microsoft Serial Mouse	\$79
Serial Mouse/Win.	\$145
Omni Mouse II w/paint	\$35

Monitors

Compudyne 14/800
14" VGA Color
.31 DP
800x600 **\$289**



Compudyne 14/1024V	
14"1024x768, .28DP	\$339
Compudyne 14/640V	
14" 640x480, .39DP	\$249
LTI 12" mono	\$75
1460A VGA mono 14"	\$115
NEC Multisync 3D VGA	\$619
Sony 1304 VGA 1024x768	\$629

CompUSER, Inc.
15151A Surveyor Addison, TX 75244
1-214-702-0055
1-800-932-2667
FAX (214) 702-0300

No Credit Card Surcharge!



Hours of operation (CST):
Monday - Friday 8am - 7pm
Saturday 9am - 2pm

Guaranteed Satisfaction!

If you find a current lower advertised price in this publication, we will beat that price, guaranteed! Competitor must have stock. Competitors shipping charges and surcharges will be calculated. Must be exact item. No-Questions-asked 30-day money back guarantee on hardware. Money back guarantee does

To Order Call 1-800-932-COMP (800-932-2667)

We will beat any published price in this magazine...Guaranteed!

COMPUDYNE 386-33C



80386, 33MHz
1MB, 32K cache
1.2 MB 5¼" Drive
IDE HD controller
101 keyboard
7 expansion slots

\$1349

1-year warranty

12" VGA White 14" VGA Color 14" VGA color
640x480 .41dp 640x480 .31dp 800x600

40MB 28ms	\$1789	\$1949	\$1989
89MB 19ms	\$1939	\$2089	\$2139
124MB 19ms	\$2029	\$2189	\$2229
211MB 15ms	\$2349	\$2509	\$2559

Video Card Included! Fully Tested!

Arima ACT 286-410



12MHz 80C286
VGA display
Keybd detaches
40MB 27 ms HD
1.44 MB floppy
\$1799

TEXAS INSTRUMENTS TravelMate 2000



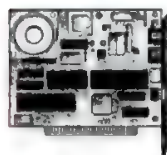
only 4.4 lbs!
12MHz 802C86
VGA Display
20MB 23 ms HD
\$1949

Toshiba Laptops All Models Call
Arima SX 2M, 40MB VGA \$2339
Megahertz T224 2400bps modem \$129
Compudyne 1.2MB ext. drive \$179
Laptop bags/modems Lowest Prices

Corporate Purchase Orders Welcome!

Boards/Scanners

COMPUDYNE 2400i



2400 baud
Internal modem
Viscom software
\$55

Complete Answering Machine \$219
Communicator \$379
Creative Labs SoundBaster .. \$149
Logitech Scanman GS 256 \$269
Niscan GS Hand Scanner \$189
Mouse System PageBrush/32 \$139

Software



Arts & Letters
A dynamic design
tool for business
graphics and
desktop publishing
\$369

Word Processing

Microsoft Word for Windows \$279
PFS: Pro Write 2.2 \$149
RightWriter 4.0 \$50
WordPerfect 5.1 \$239

Spreadsheet

Lotus 1-2-3 2.2 \$319
Microsoft Excel 3.0/ Windows \$289
PFS: First Choice 3.1 \$91
Quattro Pro \$299
Lotus 123 3.1 \$379

Windows

Adobe Type Manager/Win \$56

Current \$199
Gramatik IV/Win \$46
HDC First Apps/Win \$46
Windows Express 3.0 \$46
Microsoft Powerpoint/Win \$279
Project/Win \$399
Excel/Win 3.0 \$289
Word/Win \$279
Productivity Pack \$36
Read Right Pro \$139
Xerox Ventura Publisher/Win \$489
Miscellaneous
D.R. DOS 5.0 \$125
Form Filler (dual media) \$77
Form Tools Gold \$52
Microsoft Works \$88
Quick Schedule Plus \$52
Top Priority \$51

Graphics
Corel Draw 2.0 \$359
Express Publisher 2.0 (dual media) \$82
Harvard Graphics 2.3 \$275
PageMaker 4.0 \$469
PC Paintbrush IV Plus \$99

Business/Accounting
DAC Accounting 4.1 \$78
Pacioli 2000 \$27
Peachtree Complete III \$136
Quicken 4.0 \$34
Timeline Project Manager \$419
Timeslips III \$155

Databases
Alpha IV \$279
PC File Plus 5.01 \$78
Paradox 3.5 \$489
Q & A Version 3.0 \$209

Languages
Microsoft C 6.0 \$289
Microsoft QuickBasic \$59
Turbo C++ \$125

CompUSER carries over 300+ Titles

Accessories/Utilities

386Max 5.0 \$69
Above Disc 4.0 \$65
Act! 2.0 \$205
Avery LabelPro \$41
Compuserve Starter Kit \$19
DesqView 2.3 \$67
Direct Access 5.0 (dual media) \$58
FastBack Plus 2.1 \$94
Headroom V2.02 \$66
Microsoft Windows 3.0 \$85
Norton Commander 3.0 \$89
Norton Utilities 5.0 \$109
Optune \$42
Org Plus Advanced 5.0 \$57
PC Tools 6.0 \$79
QEMM 386 5.1 \$55
Resume Maker \$26
Spinrite II \$59
System Sleuth \$69
WinSleuth \$69
My Advanced Mail List \$26

Communications

Laplink III \$84
PC Anywhere IV \$89
Prodigy 3.1 \$23
Procomm+ 2.0 \$59

Education/Games

Chessmaster 2100 \$29
F-19 Stealth Fighter \$37
Falcon AT \$29
Leisure Suit Larry \$22
Math Rabbit \$20
Microsoft Entertainment Pack \$25
PC Globe + \$35
Playroom \$24
Sim City \$27
Links \$28
Menuworks \$14
Check It 3.0 \$78
Sideways 3.3 \$52

not include shipping.

All returns must be in "as new" condition, w/ original packaging, w/o modifications or damage. Returns require an RMA (Return Merchandise Authorization) Number.

Defective Software exchanged for same item only. Defective hardware repaired or replaced at

CompUSER's discretion.

Most orders placed before 2pm Central Time will be shipped same day. COD, Visa, MasterCard, Discover, Checks and Cashier Checks accepted. Texas residents add sales tax. Freight charges - min. \$6/order UPS Ground. Air freight: 1-10 lbs. \$8; 11-15 lbs. \$15. Call for

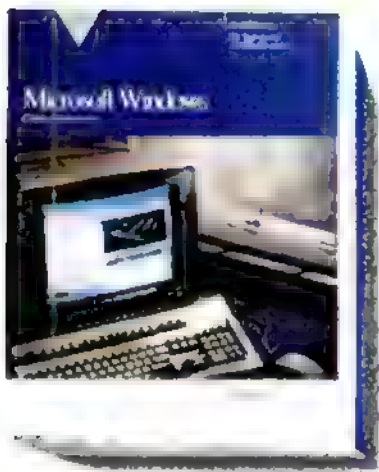
overnight freight charges. Not responsible for typographical errors, errors in photography, or errors of omission. Prices and availability subject to change. Due to changing market conditions, call us toll free for current pricing and availability. Domestic orders only.

Company purchase orders accepted upon credit approval.

The perfect en the lazy and p



Environment for over-hungry.



The Microsoft® Windows™ graphical environment version 3.0 makes it easy for you to do a lot more with your PC. That's because the Windows environment has friendly icons, menus and dialog boxes that make its powerful features very accessible.

Windows lets you work with a variety of applications on-screen at the same time. Including your character-based programs.

But it's when you start using Windows applications that you get the most out of your PC. Windows applications are easy. In addition they all work essentially the same way. So once you learn how to use one, you generally know how to use them all.

And they're so intuitive that experimenting with them is fun.

Windows applications let you

cut and paste text and graphics. And let you combine them right on your screen. They also let you print out exactly what you see.

You can even establish links between Windows applications. Which means, if you change any numbers in Microsoft Excel for Windows, the chart you cut and pasted into your Microsoft Word for Windows document will be automatically updated.

So call us at (800) 541-1261, Department P30, to find out more about Windows, Windows applications or the big Windows World Conference and Exposition coming up May 20th-23rd in Atlanta.

Because with Windows, you can start taking the work you do every day a little easier.

And have more to show for it.

Microsoft®
Making it all make sense™



GUESS WHICH MANAGER HAS CHARISMA

What's most important about a business presentation is how good you look after everybody else has finished. No matter what you know, it's how well you've communicated that usually determines your success. That's why you need Charisma.

Charisma is a complete graphics program for business, combining text charts, graphs, and drawing tools in one powerful package. Switch to Charisma and you can stop switching back and forth between all the other programs to get what you need. Now it's all at your fingertips.

The time and energy you save can be used to refine your presentation. And think of the time your work group will save by only having to be proficient with a single easy-to-learn graphics program.

Another clear advantage is Charisma's compatibility with Windows 3.0 which conveniently pops hundreds of options on the screen for rapid experimentation. Browse through chart types, clip art, 42 outline typefaces, perspective chart effects, colors, gradients, chart templates, and free form layouts, to name a few.

Charisma also includes drawing tools that will help the

beginner and offer the power user maximum control. So finding the combination that gives your presentation the right snap will be quick and easy.

Charisma can import many other graphic and spreadsheet formats, but more importantly, imported text, charts, and graphics arrive as data and can be further manipulated and incorporated.

When boundaries disappear creativity flourishes. The usual can be made unusual. Communication becomes forceful and unique. Charisma turns drudgery into innovation.

Make your next presentation a memorable performance. Ask for Charisma at your local software dealer or through your corporate purchasing department.

Or call MICROGRAFX directly at 1-800-733-3729, ext. 3250 (USA) or 3710 (Canada) for our special free offer of a self-running demo (supplies limited).

MICROGRAFX
CHARISMA

THE LEADER IN WINDOWS 3.0 GRAPHICS

Bill Machrone



Unreasonable Expectations?

If you have an older piece of equipment, what should you expect in the way of technical support?

Look around you. Chances are you've got some outmoded computer equipment sitting idle. That old daisy wheel printer. That expanded memory board encrusted with 64K chips. An original Compaq portable that no one wants to lug home anymore. A Novation 1200 modem. Sometimes usable equipment languishes as much for lack of technical support as for low performance or lack of features.

So far, the industry has had a pretty good track record in supporting old versions of products. You can call NEC, for instance, and ask tech support for the proper switch settings to get an old Spinwriter running with your

brand-new PC. They'll help you get ribbons, print wheels, and whatever else you need to keep it run-

ning. You can call Dell and they'll talk you through the steps of reformatting your 40MB hard disk and installing the appropriate drivers for greater-than-32MB support on your old PC's Limited 212. You can call Compaq and they'll tell you to call your dealer. You can call IBM for support on the PCjr, PC Network, and any number of old accounting software programs.

But you can't call Eagle, Hyperion, PC Designs, Columbia, Novation, and countless others that have passed on. Walking down 33rd Street in Manhattan the other day, I saw a Hyperion sticking out of a garbage can. It wasn't some irremediable problem that put it there, it was lack of support.

Companies such as NEC have made a high-level commitment to 100-percent customer satisfaction. The problem is that they're seldom supporting the original customer when they receive calls on old products. The caller is often the second, or even the third owner. The caller doesn't have the documentation and also doesn't have a realistic frame of reference in terms of what the product can do compared with today's equipment. He or she bought it because it was cheap and because the low price meant the difference between having a computer and not having one.

BY THE POUND

A significant percentage of the callers are from nonprofit organizations. The equipment has usually been donated; corporate America's castoffs. The expectation level of these callers is very high, as are their needs. When they call for tech support, they're heavily dependent on the person at the other end of the wire. I've worked with my local United Way and encountered what amounts to computer poverty. They're wrestling with questions such as, "Should every machine have a megabyte of RAM?" and "Is there a real benefit to VGA over CGA?" I've seen them running *PageMaker* under *Windows 2.0* on a 6-MHz AT with a meg of RAM and the original 30MB hard disk. They never have state-of-the-art software because they buy the excess inventory of obsolete versions from distributors.

Another reason why some products never seem to go away is that they feel too valuable. One of the aforementioned NEC Spinwriters graces my basement. It weighs about 60 pounds and is in perfect operating condition. It used to be one of the best, fastest ways to get words onto paper, and it still works the old-fashioned way: by putting a dent in the paper and filling



ILLUSTRATION JOHN LABBE

it with ink. Never mind that you had to schedule your printing around family activities so no one would be in the same room with it; it was beautiful. Everything about it was substantial, including the price. It listed for over \$3,000 when it was new. It takes real courage to dispose of something that cost that much, or to realize that a sub-\$400 Canon BubbleJet is far better suited to most home and light office applications.

Hassle-Free Printer Sharing

for the HP LaserJet II, IID, III and IIID



"The ServerJet is the smoothest and most practical way I know to share a LaserJet."

Frank J. Derfler, Editor
PC Magazine, 1/15/91

Here's how you and your co-workers can have your own HP LaserJets without breaking the corporate budget.

It's called **SimplAN ServerJet**.

Simply plug the *ServerJet* into the 'Optional I/O' slot of your HP LaserJet. Stretch phone cable, up to hundreds of feet, to each computer. Then, 12 people can simultaneously *whoosshh* documents to the LaserJet at speeds as fast as 115,200 baud.

No more wandering down the hall with floppy in hand.

Or borrowing someone else's LaserJet.

Or wasting time waiting to print.

The *ServerJet* is available in a variety of models with up to 4MB of buffer memory. And because your office may have printers other than HP LaserJets, ASP Computer Products offers a complete line of printer sharing solutions.

To order your *ServerJet* or for more information call ASP at:

800-445-6190



ASP COMPUTER PRODUCTS, INC.

1026 W. Maude Avenue, Suite 305
Sunnyvale, California 94086
Phone: 408-746-2965 • Fax: 408-746-2803

SimplAN & ServerJet are trademarks of ASP Computer Products, Inc. / HP LaserJet is a registered trademark of Hewlett-Packard Co.

CIRCLE 727 ON READER SERVICE CARD

Bill Machrone

DOOR SLAMMER

But even the most dedicated manufacturers are beginning to feel the drain of keeping tech support people knowledgeable about these old products. It ties up talented people and keeps them from learning new products. Should a company simply refuse to support products more than, say, five years old? Should it turn old products over to a 900 number? Is there a business opportunity for firms to specialize in supporting older products? Perhaps manufacturers should spin off old product lines to companies that can support them effectively. The demand is low for *Windows* drivers for an Okimate 10 or a Pinwriter5, but it does exist. There's no upside for Okidata or NEC to write these drivers, but the profit motive for a smaller company could be significant, especially if the original manufacturers directed support calls their way.

MEA CULPA, I THINK

On another topic, I've gotten an inordinate number of letters, phone calls, MCI Mail messages, and notes on PC MagNet in reference to my January 29, 1991, column, "Extend Your Reach." In it I mentioned some products and sources for remote power management devices you can control from your PC. I didn't, however, include phone numbers or addresses (other than the city and state) for sources. I was amazed at the readers' lack of resourcefulness: they found it easier to call/write/e-mail me than to pick up the phone and check 800 information or Atlanta area information for Home Automation Laboratories' phone number.

More to the point, this is a column, not a product review. If I start putting phone numbers in with company names, where should I stop? If I mention that a firm in Atlanta called Home Automation Laboratories has a neat catalog, I suppose I could run its phone number. But should I throw in Microsoft's number if I mention them? Should this column list numbers for all companies mentioned? Suppose I mention only one source for a product. You can bet that everyone else on the planet who offers the product will call and demand equal time. So here's my commitment: I promise to give you *enough* locational information, not necessarily *all* of it. The rest is up to you. ■

Everything You Ever Wanted In UNIX. And Less. \$99.95*

OK. We know it's hard to believe. So just consider this. Coherent™ is a virtual clone of UNIX. But it was developed independently by Mark Williams Company. Which means we don't pay hundreds of dollars per copy in licensing fees.

What's more, Coherent embodies the original tenet of UNIX: small is beautiful. This simple fact leads to a whole host of both cost and performance advantages for Coherent. So read on, because there's a lot more to Coherent than its price.

SMALLER, FASTER...BETTER.

Everybody appreciates a good deal. But what is it that makes small so great?

For one thing, Coherent gives you UNIX capabilities on a machine you can actually afford. Requiring only 10 megabytes of disk space, Coherent can reside with DOS. So you can keep all your DOS applications and move up to Coherent. You can also have it running faster, learn it faster and get faster overall performance. All because Coherent is small. Sounds beautiful, doesn't it?

But small wouldn't be so great if it didn't do the job it was meant to do.

LESS IS MORE!	Coherent For the IBM-PC/AT and compatible 286 or 386 based machines.	Santa Cruz Operation's XENIX 286, Version 2.3.2
No. of Manuals	1	8
No. of Disks	4	21
Kernel Size	64K	198K
Install Time	20-30 min.	3-4 hours
Suggested Disk Space	10 meg	30 meg
Min. Memory Required	640K	1-2 meg
Performance*	38.7 sec	100.3 sec
Price	\$99.95	\$1495.00

*Byte Eked benchmark, 1000 iterations on 20 MHz 386. Hardware requirements: 1.2 meg 5¼" or 1.4 meg 3½" floppy, and hard disk. Does not run on Microchannel machines.

EVERYTHING UNIX WAS MEANT TO DO.

Like the original UNIX, Coherent is a powerful multi-user, multi-tasking development system. With a complete UNIX-compatible kernel which makes a vast world of UNIX software available including over a gigabyte of public domain software.

Coherent also comes with Lex and Yacc, a complete C compiler and a full set of nearly 200 UNIX commands including text processing, program development, administrative and maintenance commands plus UUCP.

CRITICS AGREE: IT'S AN INCREDIBLE VALUE!

"Mark Williams Co. seems to have mastered the art of illusion; Coherent comes so fully qualified as a UNIX clone, you find yourself thinking 'I can't believe it's not UNIX.'"

—Sean Fulton, UNIX Today!,
November 26, 1990

"...(Coherent) may be the best thing that has happened to UNIX yet."

—William Zachmann, PC Week,
November 5, 1990

"If you want to come as close as you can to real UNIX for a low price, COHERENT can't be beat."

—Warren Keuffel, Computer Language
Magazine, November 1990

"If you want a UNIX-like development and learning system for less than \$100...I don't see how you can go wrong with Coherent."

—David Fiedler, BYTE Magazine,
November 1990

EXPERIENCE, SUPPORT AND A 60-DAY MONEY BACK GUARANTEE.

Wondering how something as good as Coherent could come from



NEW COHERENT RELEASE 3.1 NOW WITH...

- elvis: vi editor clone
- SCSI (Adaptec AHA 154x series and more on the way.) and ESDI support
- UUCP Bulletin Board System
- RAM disk support
- And much, much more!

OVER 10,000 SATISFIED USERS!

nowhere? Well it didn't. It came from Mark Williams Company, people who've developed C compilers for DEC, Intel, Wang and thousands of professional programmers.

We make all this experience available to users through complete technical support via telephone. And from the original system developers, too!

Yes, we know \$99.95 may still be hard to believe. But we've made it fool-proof to find out for yourself. With a 60-day money-back no-hassles guarantee.

You have to be more than just a little curious about Coherent by now. So why not just do it? Pick up that phone and order today.

You'll be on your way to having everything you ever wanted in UNIX. And for a lot less than you ever expected.

1-800-MARK WMS

(1-800-627-5967 or 1-708-291-6700)

FAX: 1-708-291-6750

60-DAY MONEY BACK GUARANTEE!



**Mark Williams
Company**

60 Revere Drive
Northbrook, IL 60062

*Plus shipping and handling. Coherent is a trademark of Mark Williams Company. UNIX is a trademark of AT&T. XENIX is a trademark of Microsoft.

**THE COMPLETE
ZEOS '386-25
DESKTOP! 64K
CACHE, 85MB DRIVE,
1MB MEMORY
& MORE.**

ONLY \$2295

- High Speed 64K SRAM Cache, providing Zero-Wait State performance vastly superior to page/interleave memory schemes.
- '386 25MHz CPU. Full 80387 and Weitek[®] math coprocessor support.
- 1MB of High Speed DRAM, expandable to a Total of 16MB.
- Ultra Fast 85MB IDE Hard Drive, Teac[®] 1.2MB Floppy Drive.
- ZEOS 14" High Res amber monitor with Tilt/Swivel Base. Includes genuine Hercules[®] brand graphics controller.
- ZEOS/RS 101 key Space Saver Keyboard.
- ZEOS I/O Card with Two High Speed Serial plus One Parallel and One Game port.
- 1-32, 6-16 and 1-8 bit expansion slots.
- Rugged ZEOS SuperCase with two cooling fans for added reliability and product life.
- Seven drive bays and our custom 300 Watt power supply for your future expansion!
- Wrap it all up with 24 Hour a Day, 365 Day per Year Toll Free Technical and Sales Support on your ZEOS Hotline. You've got a winner!

Options Galore:

Including 14" 1024 VGA, additional memory, an incredible selection of hard drives: SCSI, IDE, RLL, ESDI or MFM and virtually any other add-on you could want. Ask about other special money saving packages too.

**ORDER NOW TOLL FREE
800-423-5891**

Own ZEOS[®]



'386 Power!

AMERICA'S BEST '386 VALUES!

If you're thinking about a new '386, you'll want a few expert opinions: "ZEOS provides quality comparable with IBM or Compaq...Excellent Value...Top Drawer...Unbeatable...Top Honors...Blows away every other computer...A smart choice!" The experts love ZEOS, and you will too. Why?

Because ZEOS really does build the very best '386 systems you can buy. So good are ZEOS systems that they have received PC Magazine's coveted Editors Choice award *Seven Times*. Recently, in naming the ZEOS '386-33 *Editor's Choice*, PC Magazine said "There is very little more you can ask from a computer." What does this mean to you?

It means you're getting the very best. Your new ZEOS '386 will give you higher Performance, superior Quality and better Support than you can get anywhere else. Take performance for instance.

DESIGNED FOR SPEED.

When they chose the ZEOS '386-33 as *Editor's Choice*, PC Magazine noted "ZEOS International designed this machine for speed—and came up with a system that topped four of our benchmark tests." Now that's fast! But how do we do it?

One way is our big, high speed SRAM cache. Each and every ZEOS 386DX system has a minimum of 64K SRAM Cache standard; *our 33MHz screamers come standard with a 128K Cache*. Every system is designed for speed. And Quality Too.

ZEOS QUALITY AND SUPPORT. SECOND TO NONE.

When you buy your new ZEOS system you are buying absolute quality. As an example, every new ZEOS '386DX comes standard with a 300 Watt power supply. We invest more in our power and cooling systems to help assure you years of trouble free operation. The same is true of *all* the components of your system.

With rip-roaring speed and the best components available, what more could there be? From ZEOS, lots more.

Like our exclusive ZEOS Customer Satisfaction Package. Including our famous 24 Hour a Day Toll Free Technical Support, 30 Day Absolute Satisfaction Money Back Guarantee, One Full Year Limited Warranty and our Express Parts Replacement policy. You're going to be very satisfied. We don't just say it, *We Guarantee it!*

ORDER NOW WITH CONFIDENCE.

As PC MAGAZINE said, ZEOS shows "you needn't be among the most expensive to be the best." And the best is waiting here for you. Why not pick up the phone right now and give us a call? Your expert Systems Consultant is waiting here now to help you tailor your new ZEOS '386 to your specific needs. Buying your new ZEOS is perhaps the best purchase decision you'll ever make! After all, your satisfaction is *guaranteed*.

ORDER NOW TOLL FREE
800-423-5891



**ZEOS
'386 SYSTEMS.
PERFORMANCE,
QUALITY, PRICE
AND SUPPORT.
AMERICA'S BEST.**

**THE COMPLETE
ZEOS '386-33
VERTICAL SYSTEM!
128K CACHE,
85MB DRIVE, 1MB
MEMORY & MORE.
ONLY \$2795**

- High Speed 128K SRAM Cache, providing Zero-Wait State performance.
- '386 33MHz CPU. Full 80387 and Weitek[®] support.
- 1MB of High Speed DRAM, expandable to a whopping 32MB on the motherboard.
- Ultra Fast 85MB IDE Hard Drive, Teac[®] 1.2MB Floppy.
- ZEOS 14" High Res amber monitor with Tilt/Swivel Base. Includes genuine Hercules[®] controller.
- ZEOS/RS 101 key Space Saver Keyboard.
- ZEOS I/O Card with Two Serial plus One Parallel and One Game port.
- 2-32 and 6-16 bit slots.
- Rugged ZEOS 8-bay vertical case with 300 Watt TurboCool Power Supply and two cooling fans for increased system life and expandability.
- Includes 24 Hour a Day Toll Free Technical Support and Full ZEOS Customer Satisfaction Package.

Options Galore:

Including 14" 1024 VGA, more memory, an incredible selection of hard drives: SCSI, IDE, RLL, ESDI or MFM and virtually any other add-on you could want. Ask about other special money saving packages as well.

**ORDER NOW TOLL FREE
800-423-5891**

FAX Orders Dial: 612-633-1325
In Minnesota Call: 612-633-4591
TDD (Hearing Impaired) Order
Call: 800-228-5389
Outside US and Canada Call:
612-633-6131
MasterCard, VISA, Discover,
Am Exp, Z-CARD and COD.
Open 24 Hours a Day,
365 Days a year!



Call Now!
800.423.5891

Thinking of a Notebook?

A few expert opinions:

- PC Magazine, *"There's a new king of the hill—the ZEOS Notebook..."*
- John C. Dvorak, *"In this category I'm most impressed with the ZEOS Notebook...it has to be the number one contender."*
- PC LapTop, *"The notebook you've been waiting for."*
- Infoworld, *"This notebook is a steal."*
- PC Week, *"An outstanding value."*
- Mobile Office, *"The best price performer in its category."*
- Byte, *"The ZEOS Notebook...a clear winner...why settle for less?"*
- Portable Office, *"The ZEOS Notebook...delivers astonishing value...sensational."*
- PC Computing, *"The ZEOS beats the Compaq."*
- Lotus, *"The ZEOS has it all—power, support, good looks."*
- Computer Shopper, *"The ZEOS Notebook...it's the hottest...an excellent value."*
- PC Sources, *"Impressive."*

Think about ZEOS.®

John C. Dvorak



In completing one discovery we never fail to get an imperfect knowledge of others of which we could have no idea before, so that we cannot solve one doubt without creating several new ones.—Joseph Priestley (1786)

It seems as though the rest of the year will be highlighted by the never-ending debate about OS/2, DOS, Unix, and any other possible operating systems of the present, past, and future. The chitchat was exacerbated by last year's incredible success of *Windows* 3.0 and by a dubious article in *The Wall Street Journal* that proclaimed Microsoft would drop OS/2.

I was most amused by reviewing videotapes of the original 1987 Microsoft OS/2 Software Developers' Conference, where a top Microsoft VP said categorically that OS/2 would be the dominant operating system by mid 1989!

What's really going on?

Several theories are floating around.

1) The "OS/2 as a Diversion" Theory. I heard this a couple of years ago, and it keeps lingering as a theory. IBM is using OS/2 as a smokescreen and Microsoft as a dupe while it gets ready to roll heavy with Unix! Microsoft gets left in the lurch, the whole world moves to Unix. IBM saves money.

2) OS/2 as a Diversion—Variation 2. This theory has Microsoft as the manipulator. In this case, OS/2 was part of some dumb scheme of IBM's, and Microsoft is just playing along. Microsoft's real plan is to keep selling DOS and slowly push users into *Windows*.

3) OS/2 as a Diversion—Variation 3. This one has it that everything we're seeing is a ploy—everything. It's all a stalling tactic so Microsoft will have the time to develop a portable (cross-platform) version of OS/2. This portable version will be the new OS platform that leads us to the promised land.

4) The "Shocked and Dismayed" Gospel. This is the litany voiced by certain Microsoft executives. The company was too enthusiastic about OS/2, and unfortunately wrong. Now it's sorry and hopes to get things back on track.

No conspiracy. No hidden agenda.

5) "Windows as a Route to OS/2" Theory. Some die-hard pundits keep pushing this notion. It says that there is a timetable designed to sucker people into moving to *Windows* to get them used to the graphical interface. Then it's on to OS/2. A more cynical variation says that each step along the way is designed to nickel-and-dime users to death with an endless series of upgrades to *Windows* and the promise of OS/2 in the background. But like waiting for Godot, the final transition never happens.

6) "Two Daughters" Theory. This concept says that all this nonsense is ludicrous. Microsoft couldn't care less about any of this as long as stuff sells. This concept calls *Windows* and OS/2 the two daughters; each will marry a different beau. One may be more popular than the other, but nobody cares as long as they get married (sold). In this scenario DOS is the son and Xenix is the adopted baby. Filthy lucre is the golden idol.

7) The Beast—Portable Windows. A reader contributed this concept through PC MagNet (*PC Magazine's* on-line service; see page 8 for more information). A variation on theory number three, it says that everything is a diver-

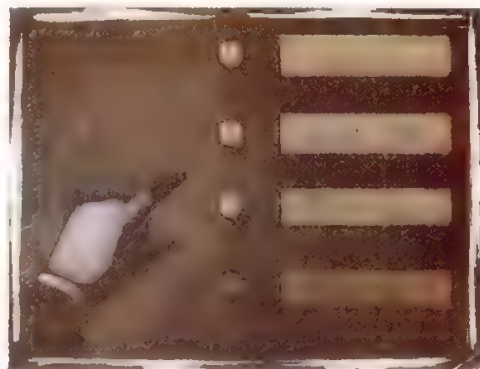


ILLUSTRATION: JOHN LARBE

sion while Microsoft secretly works on a portable *Windows*. It will run on top of *any* operating system including DOS, Unix, and OS/2—perhaps even some mainframe operating systems. This theory stems from a perception that Microsoft is concerned with the threat of X-*Windows* and Motif. Portable *Windows* is referred to by some as *Windows*, Version 666—the beast.

You pick one.

What exactly is the story behind the failure of OS/2?

Finally, The Promised LAN

Oracle Client/Server Systems are open, portable, integrated. And here.

Oracle's integrated family of products lets you take everything you've read about client/server systems in the magazines and put it to use in the workgroup. Combining the economy and flexibility of PCs with the performance and integrity that used to require a mini at the very minimum.

ORACLE is portable. Giving you the widest choice of desktop servers: OS/2, six different UNIX systems and shortly, both Netware and Macintosh. ORACLE also lets your existing minis and mainframes act as servers to desktop machines.

ORACLE works with all your existing networks. Or any networks you'd like. Novell Netware 286/386. IBM LANserver, Microsoft LAN Manager, Banyan VINES, TCP/IP, and many others.

And it goes without saying that because ORACLE is open, it supports all the front running front-ends. Including Paradox, Lotus 1-2-3, even Dbase applications.

Or you can develop your own client applications with Oracle's integrated set

of development tools. Including a powerful 4GL, screen generator, report-writer and menu generator.

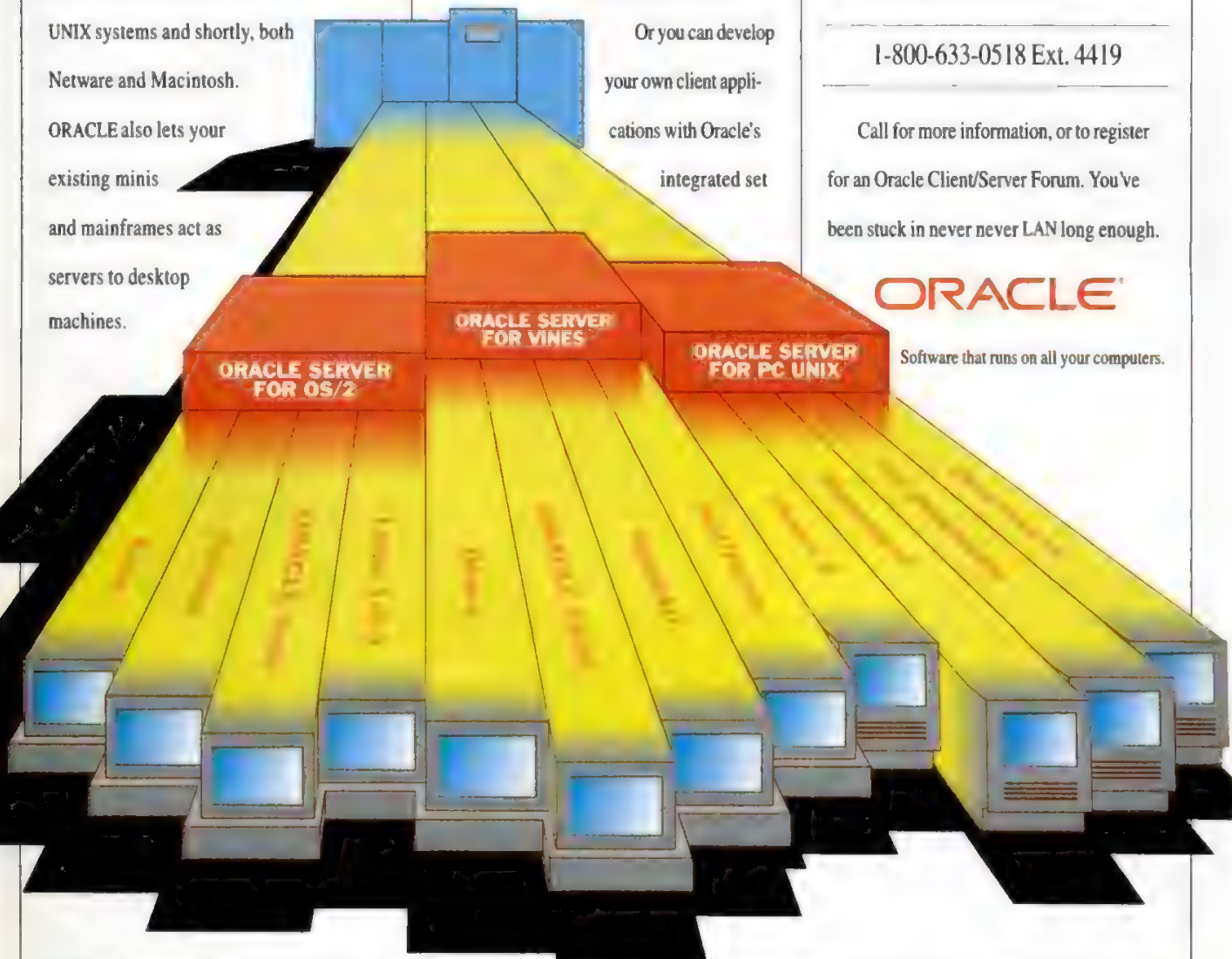
But more than just software products, Oracle provides all the support services to fully transfer client/server technology to you. These services, in combination with ORACLE software products, guarantee your technology investment.

1-800-633-0518 Ext. 4419

Call for more information, or to register for an Oracle Client/Server Forum. You've been stuck in never never LAN long enough.

ORACLE®

Software that runs on all your computers.



Inside Track

It wasn't news when Compaq announced that it would do a **RISC machine**. It was known since 1989 that the company was looking into using either the SPARC or the MIPS RISC processor to create a "third platform." The third platform moniker, of course, is something of a misnomer since there are already at least eight desktop platforms: PC, Mac, Sun/Unix, Amiga, Atari, Apple IIcx, RS6000, NeXT. You may also want to include the Sharp Wizard as a ninth. Actually, what third means in this case is "third biggest" after PC and Mac. It could become **the number one platform** if things fall into place.

What wasn't known in 1989 was that Compaq would bring in DEC as a **strategic partner**. This forebodes a merger, if you ask me. (Rumor has it that Compaq is talking merger with Silicon Graphics, too.) According to published reports, both DEC and Microsoft are supporting the Compaq maneuver, as is the chip design firm MIPS. Compaq hopes to use the MIPS R4000 64-bit super chip. If this plan doesn't pan out, MIPS will have to change its name to **MegaFlop**.

This really began when Intel announced that it would both single-source the 80386 and also **build systems** to compete with Compaq. Compaq, selling billions of dollars' worth of equipment, was not about to paint itself into a corner by relying solely on a **hungry competitor** for the main part on its machines—the CPU. It was time for Compaq to rethink its strategy. The decision was not unlike the **IBM decision** to avoid the Z-80 chip for its first PC in favor of the 8088. Exxon owned Zilog and had **vowed to dominate** office computing.

If history is going to repeat itself, then this event may signal the beginning of a change.

We have to remember, though, that when the previous platform change (from Z-80 CP/M machines to 8088 MS-DOS machines) happened, it **wasn't as obvious** during the change as it is looking back. We can assume the **same kind of mess** during any future transition. Let's remind ourselves of the numerous **Z-8000-based machines** as well as also-rans such as the Victor 9000, designed by the illustrious Chuck Peddle; the Fortune Computer; promised machines based on the high-speed Z-80H, and bit-slice machines; miscellaneous boat anchors; dual-processor machines; and so on, and so on. All the while CP/M users were telling us to **stick with 8-bit** computers while showing how poorly the early PCs performed. The computer market remained **confused** as the DEC Rainbow appeared; Digital was going to save the day and lead us all to glory.

In the end, after toying with alternatives, the industry swung back to the market-savvy Intel and its "inferior" 8088.

It's possible that a **swing to RISC could swing back to Intel** and its i860 or even the 80586, which is supposed to incorporate RISC while maintaining 386 compatibility.

There are two forces to be considered if we are to understand the big picture. The first is the force of RISC itself. What you hear most from skeptics and CISC boosters is that RISC has no real design advantages and it's **a lot of hot air**. They

like to point out that CISC chips make all the money, period. But, and this is important, almost all the other observers note that the **design cycle** for RISC is so short (when compared with CISC designs) that within a couple more generations of chips, **CISC will be buried** by the performance advantage of RISC. This problem is exemplified by the slowness to market of the Motorola 68040. CISC will be playing catch-up from now on. The counterargument is that **superior technology** does not always win the marketing war.

The second force is the **juggernaut** of an installed base of 8086/88 code. This wasn't nearly the problem in 1981 that it is today. RISC boosters like to say that a **386 emulator** would solve this problem, but emulation technology is inefficient and never foolproof. Another alternative is to use a dual-processor design with an on-

board 386. This approach just gives the programmers a further excuse to keep coding for the old 386 chip set (because of the huge installed base).

Neither of these two forces seems favorable to the evolution of a new platform, yet Apple showed with its Macintosh that a company smaller than IBM (by far) can establish a new platform by itself. Can Compaq, with the help of DEC, Microsoft, and MIPS, do the same thing? It's possible, but the following aspects would have to be present in the PC market: The prices of the machines would have to be as cheap as 486/586 systems and offer substantially more power; others would have to **jump on the bandwagon** with clones; and software developers would have to get excited.

Theoretically, a **RISC-based super machine should cost no more than anything currently for sale**. So it's possible for that need to be fulfilled. As for issue number two: Others are looking into RISC, including Apple. The developers' acceptance is the big "if."

One last observation. Apple is the kind of company that can make RISC popular. It requires hype. The RISC moniker itself, if made synonymous with power and modernity, **could alone kill CISC**. ■

Compaq may
bring in DEC as a
strategic partner
to manufacture
a RISC machine.
This forebodes
a merger, if
you ask me.

No Other Name Means Value and Performance



When it comes to value and performance, nobody beats EPS! EPS Technologies has successfully established itself as a major competitor in the personal, corporate and government business environments.

In December 1989, EPS stepped to the forefront of the industry by becoming the first company to introduce a revolutionary new 60-day money back guarantee. Others may imitate, but EPS continues to lead the way with innovative value and uncompromising performance!

Don't take our word for it, read what the experts are saying about EPS:

"The EPS 386/25 is a reliable choice for anyone moving up to a 386 to take advantage of Windows, multitasking, or simple brute desk-top power and speed. If you can guarantee quality as well as price and service, you've got a perfect-purchase triad. EPS is an excellent example of this three-cornered philosophy."

—Computer Shopper, 2/91
Reviewer: Gregg Keizer

"End-users voted EPS SX and 486 systems Reader's Choice Awards for all of 1990."

—Computer Monthly, 2/91
Reader's Choice Awards

"The EPS 386-33 is a machine that is bursting with promise. On paper and in our tests the machine gives up nothing to its competitors. EPS is committed to the long haul."

—PC Magazine, 12/25/90
Hardware Review: Fredric Burke

"The EPS 80386/25 is a lot of machine for the money, and the service is outstanding. It has probably the best money back policy in the business and is a top-of-the-line machine all the way around."

—Computer Buyer's Guide, 6/90
Hardware Review: Ron Albright & Joey Bruno

"EPS is as strong an organization as they are smart. Concern for detail is found throughout the EPS. It ran faster than many other SX machines. The system was flawless in software compatibility and a pleasure to use."

—Computer Monthly, 12/90
Hardware Review: Douglas E. Kilarski

We've achieved many reviews like this by using outstanding quality, high-end components. Using industry-leader, name brand components guarantee you'll give us the same reviews. For risk-free convenience, EPS gives you a 60-day money back guarantee to facilitate your evaluation and a full 1-year warranty with on-site service through TRW included.

When you add it all up, the obvious choice is EPS!



System Satisfaction...

an EPS Tradition!

EPS 386-SX 20 MHz

- Intel 80386 SX 20 MHz Microprocessor
- 2 Meg 0 Wait State RAM
- Desktop Case 220 Watt Power Supply
- Socketed For 80387 SX Co Processor
- AMI BIOS/ Clock Calendar
- 2 Serial/ 1 Parallel/ 1 Game Port
- Slots 2-8, 6-16 Bit
- Teac 1.2 and 1.44 MB Floppy Drives
- MAXTOR 40 Meg IDE HD (17ms) (150,000 HRL MTBF)
- MAXTOR 16 Bit IDE Controller
- EPS 14" Monitor 1024 x 768 .28 Dot Pitch
- w/ 1024x 768 1 Meg SVGA card (1 Meg for 256 colors at 1024 x 768) (1 Meg for 32,768 colors at 640 x 480)
- 101 Keyboard
- MS Windows 3.0 w/ Logitech Mouse
- MS DOS 4.01 or 5.0 w/ GW Basics
- 1 Year Warranty/ On Site Service
- 60-Day Money Back Guarantee

\$1,795.00

as low as \$65.00 a month

EPS 386-25 MHz

- Intel 80386 25 MHz Microprocessor
- 4 Meg 0 Wait State RAM
- Desktop Case 220 Watt Power Supply
- Socketed For 80387 or Weitek Co Pro
- AMI BIOS/ Clock Calendar
- 2 Serial/ 1 Parallel/ 1 Game Port
- Slots 2-8, 5-16 & 1-32 Bit
- Teac 1.2 and 1.44 MB Floppy Drives
- MAXTOR 80 Meg IDE HD (17ms) (150,000 HRL MTBF)
- MAXTOR 16 Bit IDE Controller
- EPS 14" Monitor 1024 x 768 .28 Dot Pitch
- w/ 1024 x 768 1 Meg SVGA card (1 Meg for 256 colors at 1024 x 768) (1 Meg for 32,768 colors at 640 x 480)
- 101 Keyboard
- MS Windows 3.0 w/ Logitech Mouse
- MS DOS 4.01 or 5.0 w/ GW Basics
- 1 Year Warranty/ On Site Service
- 60-Day Money Back Guarantee

\$2,295.00

as low as \$72.00 a month

EPS Options to Fit Your Exact Needs

- Sony 130+ NON-INTERLACED MONITOR 1024 x 768 .25 dot pitch, flicker-free.
.....Add: \$275.00
- MAXTOR 80 meg 17ms IDE hard drive on 386-SX 20 MHzAdd: \$149.00
- MAXTOR 130 Meg 15ms IDE hard drive on 386-SX 20 MHzAdd: \$240.00
- MAXTOR 40 Meg 17ms IDE hard drive on 386-25 MHzSubtract: \$149.00
- MAXTOR 130 Meg 15ms IDE hard drive on 386-25 & 33 MHzAdd: \$110.0
- MAXTOR 213 meg 15 ms IDE hard drive on 386-33 MHzAdd: \$375.00
- MAXTOR 80 meg 17ms IDE hard drive on 486-33 MHzSubtract: \$375.00
- MAXTOR 130 Meg 15ms IDE hard drive on 486-33 MHzSubtract: \$265.00
- EPS-SX 20 MHz/64K CacheAdd: \$195.00
- EPS 25 MHz/64K CacheAdd: \$250.00
- EPS 386-33 MHz / 486-33 MHz 256K Cache upgradeAdd: \$145.00
- EPS Tower optionAdd: \$110.00

EPS 386-33 MHz

- Intel 80386/ 33 MHz Microprocessor
- 4 Meg 0 Wait State RAM
- 128K (25 NS) Static RAM Cache Expandable to 256K
- Desktop Case/ 220 Watt Power Supply
- Socketed For 80387 or Weitek Co Pro.
- AMI BIOS/ Clock Calendar
- 2 Serial/ 1 Parallel/ 1 Game Port
- Slots 2-8, 5-16 and 1-32 Bit
- Teac 1.2 and 1.44 MB Floppy Drives
- MAXTOR 80 Meg IDE HD (17 ms) (150,000 HRL MTBF)
- MAXTOR 16 Bit IDE Controller
- EPS 14" Monitor 1024 x 768 .28 Dot Pitch
- w/ 1024 x 768 1 Meg SVGA card (1 Meg for 256 colors at 1024 x 768) (1 Meg for 32,768 colors at 640 x 480)
- 101 Keyboard
- MS Windows 3.0 w/ Logitech Mouse
- MS DOS 4.01 or 5.0 w/ GW Basics
- 1 Year Warranty/ On Site Service
- 60-Day Money Back Guarantee

\$2,595.00

as low as \$76.00 a month

EPS 486-33 MHz

- Intel 80486/ 33 MHz Microprocessor
- 4 Meg 0 Wait State RAM
- 128K (25 NS) Static RAM Cache Expandable to 256K
- Desktop Case/ 220 Watt Power Supply
- Socketed For Weitek 4167 Co Processor
- AMI BIOS/ Clock Calendar
- 2 Serial/ 1 Parallel/ 1 Game Port
- Slots 1-8, 6-16, 1-32 Bit
- Teac 1.2 and 1.44 MB Floppy Drives
- MAXTOR 213 Meg IDE HD (15 ms) (150,000 HRL MTBF)
- MAXTOR 16 Bit IDE Controller
- EPS 14" Monitor 1024 x 768 .28 Dot Pitch
- w/ 1024 x 768 1 Meg SVGA card (1 Meg for 256 colors at 1024 x 768) (1 Meg for 32,768 colors at 640 x 480)
- 101 Keyboard
- MS Windows 3.0 w/ Logitech Mouse
- MS DOS 4.01 or 5.0 w/ GW Basics
- 1 Year Warranty/ On Site Service
- 60-Day Money Back Guarantee

\$3,995.00

as low as \$112.00 a month

**Order Toll-Free
800-447-0921 Tech
Hot Line
800-526-4258**



"a tradition of value and performance"

EPS Technologies, Inc.

10069 Dakota Ave.

P.O. Box 278 Jefferson, SD 57038

605-966-5586 FAX Orders: 605-966-5482

Hours: 8 a.m. - 7p.m. Mon.-Fri.

9a.m. - 3p.m. Saturdays

• Mastercard, Visa accepted - No Surcharge

Access Abilities.

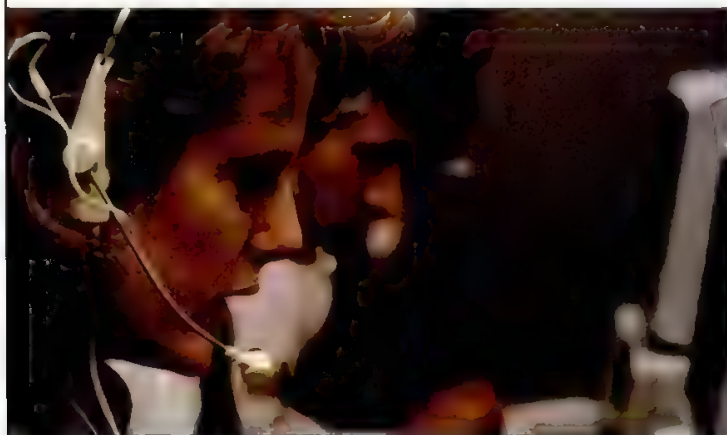
pcANYWHERE IV.
Enhanced performance remote computing.



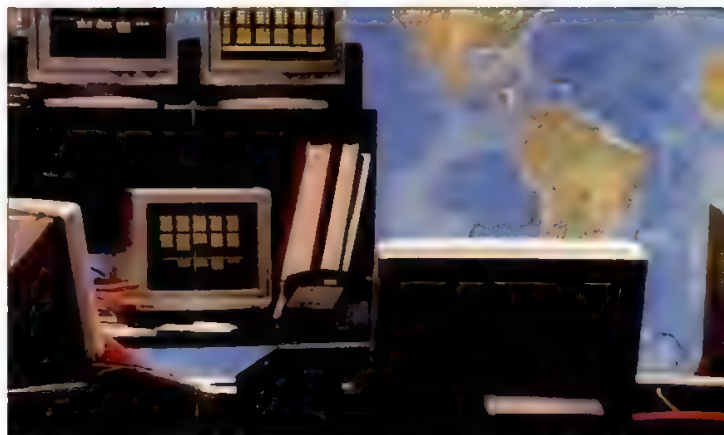
With high-speed, PC-to-PC remote computing and general communications capabilities, pcANYWHERE IV is the only software you need to enhance your access abilities.



Even on the move, you're just a phone call away from direct access to diverse computer resources... your office PC, mini or mainframe computer, the company LAN, public bulletin boards, mail services, reservation systems.



Use pcANYWHERE IV for support and training. Technical assistance and one-on-one instruction are immediately available from the expert to the user in need, without even leaving their workstations.



Let pcANYWHERE IV work nights! Automate file transfers, start and run programs and procedures at a specified time, at a distance, unattended. Look for pcANYWHERE IV whenever you need to upgrade your access abilities.

See us at booth #152

 **COMDEX '91**
The World's Leading Computer Trade Show for Resellers and End-Users

at SPRING
May 20-23, 1991 • Atlanta, Georgia

DMA

1776 East Jericho Turnpike, Huntington, NY 11743
(516) 462-0440

pcANYWHERE IV is a trademark of DMA. Other products are trademarks of their respective manufacturers.
CIRCLE 332 ON READER SERVICE CARD

Jim Seymour



What's Wrong with Graphics Software...

It's time that yesterday's charting and graphing software catches up with the needs of today's business user.

A series of radio ads in Texas a few years back opened with an announcer asking "What are you mad about today, Eddie?" A gravelly voice—Eddie, a wealthy Texas oil field-equipment supplier—then weighed in with the day's harangue against some no-good, welfare-state, Yankee, liberal nonsense.

Those ads, and Eddie himself, have gone the way of the oil boom, but I'm going to adopt his trademark opening: I'm mad. I'm mad about graphics programs that are old and outmoded. And about software companies that don't take their graphics packages seriously, but just keep milking these cash cows with half-hearted, half-witted upgrades.

Graphics applications have been the backwater of the software business for years. There are exceptions (*PowerPoint* and *Persuasion*, for example), but the charting and graphing programs most of us use—to turn out bul-

let-chart overheads for a meeting, or to put together a few market-share pie charts for a report—reek of early-Eighties design. At best.

Harvard Graphics has gotten tweaks and cleanups since Software Publishing introduced it, but it still feels remarkably like the program Mario Chavez developed in 1986. What was slick five years ago is tired today. SPC adds crude clip-art libraries and hypertext-like "jump" buttons, and we do mid-air flips, as if it had done something important. C'mon, SPC: *Harvard* needs a major overhaul.

Lotus's *Freelance Plus* is *Harvard Graphics*' running mate at the top of the market. But *Freelance* is even worse than *Harvard* in the long-in-the-tooth department: It's little changed from the package Lotus bought five years ago. Lotus made improvements this year in an OS/2 version of *Freelance*...but who's going to buy an OS/2-PM program now? C'mon, Lotus: You've been milking this market way too long. Fix it or fold it.

Here are ten steps that publishers of graphing software could take to catch up:

More Chart Types: No current PC graphics program includes enough graph types. Very few include such useful and powerful choices as bubble charts and polar charts. Software developers claim few PC users actually use these kinds of graphs—but that's a chicken-and-egg problem: how *could* they, when the software doesn't offer those possibilities?

Chart and Data On-Screen Simultaneously: When a graphing program allows you to enter data directly into a form (rather than going out to a spreadsheet for the numbers), it ought to allow you to see that form on-screen along with the graph based on those numbers. Users should have a choice between seeing changes in the tabular data reflected immediately in the graph, or having the graph redrawn only after a "redraw now" command.

Easy Spreadsheet Linking and Easy Direct-Entry of Data: No PC graphing program I know has both. A program may do one or the other pretty well—but invariably, it does the other poorly. Both approaches should be fast and easy to use.

Multiple Graphs per Page, and Easy Scaling to Page: It ought to be easy to issue a "layout" command that would produce two, three, four,



ILLUSTRATION: JOHN LABBE

or more graphs on a single page. And it should be easy to independently scale any or all of those graphs (as well as single graphs) to whatever size and position we want on the printed page.

Better PostScript Drivers: The PostScript drivers in most graphing packages stink. They make feeble use of PostScript operators and little use of PostScript typefaces. Of all the programs that should use PostScript well,

No More Mousin' Around



AT-Bus Interface Card

FT-1000 Precision Light Pen



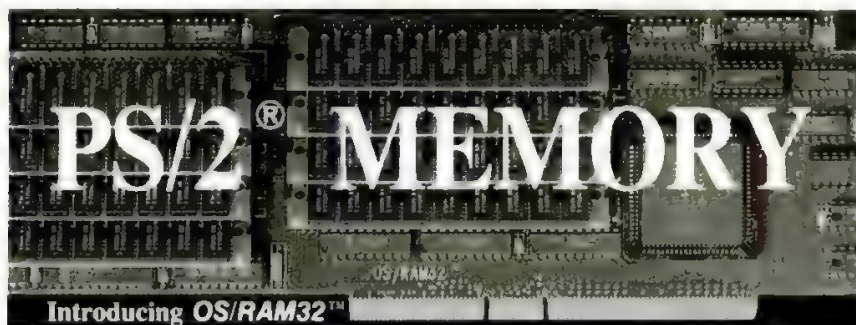
Micro Channel Interface Card

Draw, point, click, drag, position - FTG's light pen does all this faster, easier & quicker than a mouse and does it without using your valuable desk space. Take a look at a sensible input alternative with FTG's 30-day trial offer.

FTG DATA SYSTEMS

10801 Dale Street
Stanton, CA 90680
714-995-3900 800-962-3900
FAX 714-995-3989

CIRCLE 524 ON READER SERVICE CARD



- ✓ 8 Mbytes of fast 32 bit memory.
- ✓ Works in all Micro Channel™ computers.
- ✓ Fast LIM 4.0 driver included.
- ✓ Provides extended and expanded memory.
- ✓ Easy switchless installation.
- ✓ Automatic configuration for DOS, OS/2 or UNIX.
- ✓ Risk free guarantee. Two year warranty.
- ✓ Accepted under IBM service contracts.
- ✓ From \$299 to \$998 with 8 Megabytes.
- ✓ "Best price performance", says PC Week.

Call today 617-273-1818 or 1-800-234-4CEC



Capital Equipment Corp.
Burlington, MA. 01803

PS/2 and Micro Channel are trademarks of IBM

CIRCLE 128 ON READER SERVICE CARD

Jim Seymour

graphing packages are near the top of the list. Why, then, such poor PostScript integration?

Better Fonts on Non-PostScript Printers:

If you don't have a PostScript printer, there's a good chance you have a laser printer with typeset-looking fonts built in, a font cartridge, or some soft fonts. Why don't PC graphing packages give us access to them? Stroke fonts are dead, guys.

Easy Annotation: Excessive annotation on the face of graphs clutters them up, but subtle use of notes (pointing to anomalous data points, for example, or showing that a series of data points is above or below an important threshold) aids comprehension. Yet it's a bear to annotate graphs in most PC software. Why? Because vendors hurriedly added annotation to win features-list contests, then never bothered to get it *right* in succeeding releases.

Instant Chart Rotation: It ought to be possible to instantly and effortlessly rotate a graph on the page. Or rotate vertical-bar graphs to horizontal bars. Or reverse the sequence of a data series. It's never easy, and often it's impossible. For shame: That's easy to fix.

More Points in Data Series: Financial and scientific types need hundreds or thousands of data points, and scores of data series. *No* business graphing program accepts enough data points or series. Limitations on the number of data points are artificial, remnants of a day when no one took PC graphing packages seriously.

Curve Fitting/Smoothing Options: You don't have to be a math whiz to want to do some curve fitting or curve smoothing. It's far easier to see where a trend is headed, and how fast, when you can apply some basic analysis, such as a best-fit option. Few PC graphing packages offer many choices, nor very useful ones, in this area. Indeed, the lack of data-analysis features is the single biggest shortcoming of PC graphing packages, across the board.

I said here not long ago that *Windows* graphics programs aren't going to knock-off older graphics packages overnight, just because of the new programs' graphical interfaces. And I said the DOS war-horses are still darned good programs. They *are* good—but they need to get a lot better, fast. Or they'll be swept under, not because of GUIs, but because they failed to grow with their users. ■

"What's the point of making more money if you still have to worry about it?"

I was making more money. But I wasn't worrying any less. Until I invested \$49.95 in a copy of Quicken.

Now I always know exactly where my money went. Exactly how much I have. Exactly what I can afford. I don't have to guess how my investments are doing.

The uncertainty is gone. I've never felt so organized about money.

I'm in control now.

Where did my money go? As I pay my bills, Quicken automatically organizes my expenses — utilities, clothes, charity, whatever — into the right categories. Then a simple keystroke gives me a report showing exactly how much I spent in every expense category each month.

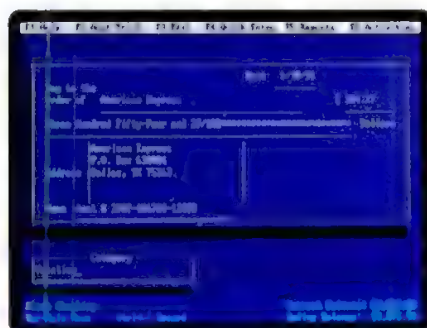
How am I doing? Another keystroke shows my budget-versus-actual. Credit application? In three seconds I've got a financial statement showing income, expenses, and net worth. Tax time? No sweat. Quicken reports all my itemized deductions plus interest, dividends, and capital gains for Schedules B and D.

Organizes investments.

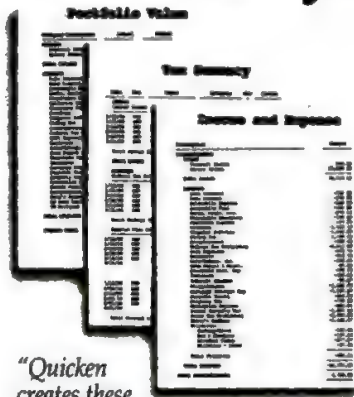
Now all my investments are conveniently organized in one place. I just press the + or - key to update prices, and instantly see the exact gain or loss for each security or the market value of my whole portfolio. One screen shows the rate of return for all my stocks, bonds, mutual funds, CDs, IRAs, and more.

It's easy.

I just pulled out the Quick Start Card and typed "install." That simple. I was doing work in 6 minutes. The screen even looks like my checkbook. There's nothing new to learn. No complicated instructions.



"Quicken's screens look just like my checkbook. I fill in the same information. There's nothing new to learn."



"Quicken creates these reports and more, instantly as I pay my bills and update my investments."

It saves time.

Time to pay bills? Quicken memorizes my regular payments. I just confirm the amounts and it prints checks for me to sign. I still use my regular checkbook when it's more convenient. Or I can pay my bills electronically through the CheckFree® payment service. Quicken saves me hours.

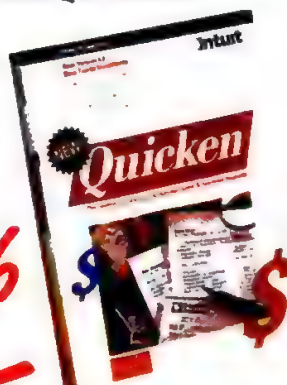
It's a powerful business tool.

Quicken organizes and controls business finances, too. It produces P&L statements and balance sheets. Forecasts cash flow. Tracks A/R, A/P, payroll, jobs, clients, properties, and more.

Try Quicken risk-free for 60 days.

Are you making more money and enjoying it less? If Quicken doesn't put you in control of your finances — or if you're not satisfied for any reason at all — you can return it within 60 days for a full refund. Order Quicken now."

World's #1 Selling Financial Software



~~\$49.95~~
\$59.95

Suggested Retail Price

SPECIFICATIONS: All IBM PC, XT, AT, PS/2, PS/1, Tandy, and compatibles with 320K RAM and DOS 2.0 or 384K RAM with DOS 3.0 or higher. All Macs with 512K RAM. IBM and Mac feature sets vary. Investment tracking, Schedule B and D reports, Balance Sheet and Net Worth not available for Mac. CheckFree not available for Mac or outside the U.S. Unlimited free technical support. Not copy protected.

"With Quicken, I always know exactly where my money goes — and exactly how much I have. Now I'm in control."



Now Save \$10.00!

Offer Expires on August 31, 1991

Send in the coupon, or call

1-800-624-8742

24 hours a day, 7 days a week, U.S. and Canada

☐ **Yes, I'm ready to take control of my finances.**

Send me Quicken for only \$49.95. If I'm not completely satisfied, I can return it within 60 days for a full refund. Free air shipping within the U.S. CA residents add sales tax. For coupon orders, allow 10 working days for delivery in U.S., slightly longer in Canada. International shipping extra.

Name _____

Address _____

City _____ State _____ Zip _____

Daytime Phone (____) _____

IBM: ☐ 5-1/4" disk ☐ 3-1/2" disk OR ☐ Macintosh

☐ Check enclosed (no purchase orders or C.O.D. please)

☐ Visa ☐ Mastercard ☐ AmEx ☐ Discover

Card No. _____

Exp. Date _____

Signature X _____



Best of 1990 and 1991

Byte Reader's Choice

World Class 1990

World Class 1991

Mail to:

Intuit

P.O. Box 3014, Menlo Park, CA 94026

Or Call:

1-800-624-8742

U.S. and Canada

Ad Code: PA05P

A Decade of Experience Delivers



SHIPPING MOST ORDERS SHIPPED IN 24 HOURS



PRICE
A DECADE OF THE
LOWEST PRICES



CONFIDENCE
WE DO NOT CHARGE YOUR
CREDIT CARD UNTIL YOUR
ORDER IS SHIPPED



CONVENIENCE
EXTENDED HOURS LATE NIGHTS,
SATURDAYS AND SUNDAYS

**Telemart Carries Much More Than Our Ad Can Hold!
If You Don't See What You're Looking For, Call Us!**

COMPUTERS DESKTOP

ALN Business Vista 386/33 #101	\$1819
AST All Models	Call

LAPTOP

Epson Equity Portable LT-286e	\$2229
Equity Portable LT-286sx	2939
Leading Edge LT386SX + Sharp PC 5541	3069
Toshiba T-1000 SE	995
T-1000 XE	1256
T-1200 XE	2199
All Other Models	Call

NOTEBOOK

Atime NSX386SX 20MG	\$2545
Epson NB3-S 20MG	2799
Epson NB3-S 40MG	3089
Everest Tempo XL 20MG	2099
Panasonic CF-150	739
Panasonic CF-170	1495
Panasonic CF-270	1989
Peopl Hand Held	835
Texas Instruments 2000 20MG	1969
Texas Instruments 3000 20MG	3299
Texas Instruments 3000 40MG	3599

MIT PRODUCTS

286/12 40MB 1 MG w/DOS	\$914
386SX 16 40MB 1 MG w/DOS	1181
All Other Models	Call

TERMINALS

Wyse 30	\$289
50	369
80	789
All Other Models	Call

SOUND BOARDS

Creative Labs Sound Blaster	\$149
Sound Blaster Midi	89

HARD CARDS

Plus Development II XL50	\$375
II 80 MG	489
All Other Models	Call

DISK DRIVES

Imagica (Bernoulli)	
40 Meg (Dual 20 MG)	\$1739
Beta 88 MG Dual 44	1675
Beta 44 MG Insider	799
Other Models	Call
Seagate ST1144A 124 MG	475
ST151 42.5 MG	319
ST225 w/CNTR 20 MG	225
All Other Models	Call
Tec 5.25 1.2 MG AT (Beige)	66
5.25 360K XT (Beige)	65
Toshiba 3.5 1.4 MG (Beige)	65

ACCESSORIES

Masterpiece	\$82
Masterpiece Plus	95
Masterpiece Remote	102
Masterpiece 400 (PS/2)	58

TAPE BACKUP

Colorado Memory System Jumbo 40/80 EXT	\$375
Jumbo 40/80 INT	230
Irwis All Models	Call

BOARDS

ATI VGA Wonder + 512K w/Mouse	\$199
Everex RAM 3000 Deluxe	79
RAM 8000	175
Mercedes Graphics Station 1 MB	635
Other Models	Call
Intel Above Board + 512K Plus	329
Above Board + w/2MG P/S	525
Above Board + w/2MG expands to 8 MG	499
Inboard 386 PC (1MG)	489
Other Models	Call
Orchid Tiny Turbo 286	295
Tiny Turbo Xtra	265
Other Models	Call
Parade VGA + 256K	195
VGA + 1B	129
VGA 1024 512K	199
Videa 7 Fastwrite VGA	149
1024 1 w/256K	219
Other Models	Call

MICE

Kensington Expert Mouse Bus	\$119
Kensington Expert Mouse PS/2/Ser	95
Logitech Serial Mouse	
New Hi-Res XT/AT	56
Logitech Mouseman Bus Right Handed	79
Logitech Mouseman Serial Right Handed	85
Logitech Mouseman Serial Cordless	129
Logitech Trackman Bus	81
MS Bus or Serial Mouse 1.0	97
MS Bus or Serial w/Windows 3.0	145
Microspeed PC Trac Bus	82

CD ROM

NEC CD ROM EXT CDR-73	\$999
CD ROM INT CDR 83	635
Panasonic Worm 940 MB	2199
Toshiba CD ROM RDR w/SCSI EXT	795

PRINTERS

LASER

Canon LBP-4 Laser	\$815
Epson 7000 Laser	858
Herzfeld Packard Laser Jet IIP	1815
Laser Jet III	1725
Okidata DL 400	635
DL 800	959
Panasonic 4420 Laser	869
Texas Instruments Micro Laser Postscript 17 Font	1299
Micro Laser Postscript 35 Font	1519
Toshiba Page Laser 8	635
All Other Models	Call

DOT MATRIX

Citizen Printer 120D	139
200GX	159
GSX 140/180	319
Other Models	Call
Epson FX 850	319
Evercom 2400 INT	269
L0510	482
L0650	189
LX810	189
All Other Models	Call
IBM Pro Printer II	285
NEC P3200	275
P3300	385
Okidata 182 Turbo	229
320 ML Par	319
321 ML Par	448
All Other Models	Call
Panasonic 1124	259
1180	155
1624	385
All Other Models	Call
Star Microelectronics NX 1500	295
All Other Models	Call

OTHERS

Canon BJ-10E	315
Dicamix 150 Plus	335
Seiko Smart Label Printer	165

OCR/SCANNERS

HARDWARE

Complete 400 Hand Scan	\$146
Full Page	529
DPI Scanner HS-3000+	149
Logitech Scanman + XT/AT	149
Scanman + PS2	212

SOFTWARE

Cal Reader Pro 1/2 Page	\$159
Cal Reader Pro Full Page	245
Complete OCR/FP	289
Complete OCR/HP	175
DPI OCR Deluxe	125

MODEMS

Ancher 1200B	\$85
2400B w/Software	85
ATI 2400 ETC INT w/SW	189
2400 ETC EXT	189
Evercom 1200 INT	49
Evercom 2400 INT	87
Other Models	Call
Hayes 2400 B	225
2400 EXT	319
9600V Series EXT	699
Other Models	Call
Intel 2400 B Classic	139
Practical Peripheral 2400 B	125
Other Models	Call
Prometheus 2400 B w/Software	99
2400G EXT	145
All Other Models	Call
U.S. Robotics Courier 2400 EXT	265
Courier HST 14.4 EXT	575
Zoom All Models	Call

DISKETTES AND TAPES

Sony 3.5 D/S D/D Case Disks	\$75
3.5 H/D (Case Only)	145
5.25 D/S D/D Disks (100)	58
5.25 High Density (100)	99
Sony Tape 150 MB/5.25	28
20-40 MB/3.5	15
60 MB/5.25	19

CO-PROCESSORS

Cyrix 60387 SX 16	\$229
80387 DX-20	249
All Other Models	Call
Intel 80287-XL	189
80387-DX 16	329
80387-SX 16	215
All Other Models	Call

FONT CARTRIDGES

Pacific Data 25 IN 1 III	\$259
Pacific Data 1-2-4 Plus 1 MB	154
Pacific Data 4.2 MB	189

FAX BOARDS

Complete 4800	\$145
9600	295
Communicator	409
PC Portable Fax	285
Everfax 24/96 INT	255

KEYBOARDS

Keytronics KBS151	\$119
KBS153	189
KBS151Plus	99

WordPerfect Office 3.0 office automation software for the PC is a package of several programs designed to help you be more productive.

\$80

Get on-line test with CROSSTALK Communicator. Transferring files, capturing data and interacting with other computers has never been easier.

\$55

1-800-622-6659

VARs/Dealers • Call 1-800-537-6753

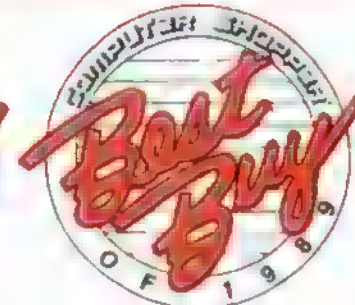
NOW ACCEPTING INTERNATIONAL ORDERS • Call our FAX (602) 944-1510

- No Charge for VISA and MASTERCARD.
- We Do Not Charge Your Card Until Your Order is Shipped.
- You Pay The Ground Shipping 1-10 \$38.00 11-20 \$42.00 (Except Alaska & Hawaii)
- We Pay the Air Difference.
- Free Air Applies ONLY to Domestic Orders Over \$100.
- All products including DCA's carry only manufacturer's warranties. We do not honor guarantees, rebates, trial period privileges or promotional programs offered by manufacturers.
- We do not guarantee machine compatibility.
- Machines compatibility disclaimer does not apply to IBM Systems.



PCM51491

CIRCLE 206 ON READER SERVICE CARD



BUYERS CHOICE



When you see the symbol, you're assured these products have been purchased most often by telemart's national customer base.

All these products have been top ranked because you, the buyer, have selected them based on their performance and the telemart price.

You'll see the symbol in each category and know you can make the same smart choice.

MONITORS

Amdek		
All Models	Call	
Solidstar		
12" White Analog (1220W)	266	
14" EGA (1420)	288	
Mitsubishi		
XC 1410 C EGA	315	
XC 1429 C VGA	315	
Diamond Scan 14"	495	
Diamond Scan 16"	1050	
All Other Models	Call	
MES		
Multisync 2A	460	
Multisync 3D 14"	560	
Multisync 40	990	
Multisync 5D	2340	
Multisync GS-2A	280	
Princeton		
Princeton Ultra 1400	380	
Sony		
Multiscan 1304 MG 14"	680	
Zenith		
ZCM 1482	600	

WORD PROCESSING

LetterPerfect	Call	
MS Word 5.5	210	
PC Outline	142	
PFS Professional Writer 2.2	50	
Right Writer 4.0	147	
WordPerfect 6.1	147	
WordPerfect Office	230	
Wordstar 6.0	230	

LAN & NETWORKING SOFTWARE

Above LAN	\$234	
ADCPAC BPI Network	229	
Data Ease LAN 3-Pak	439	
DBase IV Lan	836	
Fontbase Plus LAN	280	
Harvard Graphics LAN Server	584	
MS Excel Exec License Pack	245	
MS Word License Pack	182	
Novell		
Net NW/286	1053	
ELS I	506	
ELS II	1149	
Paradox 3.5 LAN	825	
PC Anywhere IV LAN	280	
Q & A Network Pack	232	
R-Base LAN 3.1	580	
Superbase 5 LAN Pack	289	
XTree Net Advanced	289	
XTree Net ELS	149	

HARDWARE

Artisoft		
Lantastic 2MBPS Starter	481	
Lantastic Ethernet Starter	505	

DATA BASE MANAGEMENT

Ask Sam 5.0	\$211	
Claris		
Personal Developer	45	
Professional Developer	451	
Clipper v5.0	490	
Data Perfect	430	
DBase III Plus	445	
DBase IV	132	
dbXL	259	
Fontbase Plus 386	182	
Fontbase Plus Single User	429	
FontPro Single User	490	
Paradox v3.5	178	
PFS Professional File	80	
Personal R-Base	217	
Q&A	468	
R-Base 3.1	619	
Revelation Advanced	145	
R&R Relational Report Writer	112	
VP Expert	112	

CAD & ENGINEERING

Auto Sketch 3.0	\$141	
Design CAD 3.0	\$108	
Generic CAD 5.0	225	
Generic CAD Starter Kit Level II	60	
Math CAD	306	
Summasketch 12x12 II	562	
Summasketch 12x18 Pro II	58	
4 Button	58	
Summasketch 12x18 Pro II	58	
16 Button	58	
Turbo Cadd	70	

Do A Little Windows Shopping With telemart

Adobe Illustrator Windows	\$278	
Adobe Streamline Windows	222	
Adobe Type Manager Windows	54	
Ami Professional	280	
Asymetrix Toolbook	285	
Becker Tools	40	
Borland C++	318	
Charmata	328	
Corel Draw v 2.0	398	
CrossTalk for Windows	117	
Current by IBM	213	
Designer	455	
Dratex Ultra Windows	487	
Dragon 1.0	78	
Facelift for Windows	119	
Facelift for Windows ValuePack	285	
Form Base v Windows	135	
Form Publisher	53	
Grammatik for Windows	48	
hDC FirstApps for Windows	29	
hDC 100M Designer		
hDC Windows Express	481	
Informa Wings	344	
MS Entertainment Pack	25	
MS Excel for Windows	395	
MS PowerPoint for Windows	395	
MS Productivity Pack	36	
MS Project for Windows	425	
MS Word for Windows	425	
Objectvision	88	
Omni Page 386	435	
PC Kwik Power Pak v 2.0	80	
PageMaker 4.0	480	
PerFORM Pro	283	
Prompt 1.0	74	
Read Write Personal	182	
Superbase 4	409	
Ventura Publisher Gold/Windows	530	
WINFAX	41	
Wordscan 286/386	383	
Wordscan + 286/386	440	

WE ACCEPT INTERNATIONAL ORDERS AND CORPORATE PURCHASE ORDERS

INTEGRATED SOFTWARE

Lotus Symphony 2.2	\$479	
MS Works	\$12	
PFS First Choice	78	
SmartWare II w/Spell Chk	429	

PROJECT MANAGEMENT

Harvard Project Mgr III	\$485	
Lotus Agenda Ver. 2.0	275	
Org + Advanced	98	
Timeline 4.0	\$438	

LIST MANAGEMENT

Address Book Plus	\$43	
Avery Label Pro (Letter or Del Matrix)	\$4	
Avery List & Mail	25	
Avery List & Mail Plus	38	
Labels Unlimited	38	

ACCOUNTING

ACCPAC API		
AP, AR, AA, INV Payroll	\$229	
ACCPAC Bedford Accounting	117	
ACCPAC Easy Gen. Acct.	53	
DAC Easy Accounting 4.1	80	
DAC Easy Bonus Pack 4.1	124	
DAC Easy Payroll 4.1	53	
One Write + Acctg. System	188	
One Write + Payroll	92	
Peachtree III	142	
Peachtree III w/Data Library	\$210	
Profitease Acc. 10-Pack	129	
TimeSlips III v.4.0	185	

telemart

EXTENDED HOURS

MONDAY-FRIDAY	8:00 am-10:00 pm PST
Sat. 8:00 am-5:00 pm PST	
Sun. 10:00 am-3:00 pm PST	

CORELDRAW!



"The World's Finest PC Illustration Software" (New Version) **\$365**

BEST SELECTION

We have the product you want.

PROFESSIONAL DESKTOP PUBLISHING

AMI Pro	\$389	
Freedom of Press	230	
PageMaker 3.0 I	490	
Form Processing		
Form Filer 3.0	\$79	
Formtool Gold 3.0	\$32	
Formworks w/Fil & File	32	
PerFORM Files	79	
PerFORM 2.1	79	

SPREADSHEET

Lotus 1-2-3 Ver. 2.2	\$325	
Lotus 1-2-3 Ver. 3.1	489	
Lucid 5.0	54	
MS Multiplan	119	
Plan Perfect v5.1	Call	
Quattro	85	
Quattro Pro	\$310	
Supercalc 5	90	

TIME MANAGEMENT

Calendar Creator Plus	\$59	
Cal Schedule Plus	\$34	
Top Priority	54	
Working Hours	53	

OPERATING ENVIRONMENTS

Carousal v5.0	\$48	
Desquere 386 v2.3	129	
MS Windows Ver. 3.0	\$91	
0 DOS II	34	

ComputerEasy®



DREAM HOUSE PROFESSIONAL is one of the quickest and easiest floor plan drawing programs available

\$38

UTILITIES

BACK UP		
Back It v4.0	\$72	
Central Point Backup	67	
Fastback Plus	\$189	
Norton Backup	93	
PC Fastback Plus	47	

GENERAL

Check It 3.0	\$79	
Copy II Option Board Deluxe	\$108	
Copy II PC v6.0	25	
Vacc Vaccine	66	
Norton Editor	143	
SPF/PC		

HARD DISK MANAGEMENT

Disk Optimizer	\$28	
Disk Technician Advanced	91	
Fasttrak v4.0	46	
Lotus Magellan	98	
Max Utilities 1990	88	
Norton Utilities 5.0	112	
Optune	43	
PC Tools Deluxe 6.0	\$38	
Spinrite II	66	
XTree Gold	88	

LAPTOP

Battery Watch Release II	\$29	
Brooklyn Bridge	84	
Desktop	98	
Laplink Release III	\$75	
Software Bridge	92	
VGA Dimmer	25	

MEMORY MANAGEMENT

386 Max 5.1 Windows	\$89	
Above Disk+ 4.0	95	
Headroom	67	
Hyper Pad v2.0	70	
Memory Mate	36	
Move Em	48	
Omni 386	\$38	
Orin	44	
Super PC-Kwik	44	

MENUING SOFTWARE

1 Dir Plus v3.5	\$45	
Auto Menu	35	
Direct Access	\$88	
Power Menu	88	

PRINT

Go Script	\$88	
Go Script Plus	175	
Impress 2.1	71	
Print O v5.0	62	
Sideways v3.3	\$50	

FREE

FASTEST DELIVERY



FEDERAL EXPRESS
You Pay The Ground Shipping
We Pay The Air Difference

PERSONAL FINANCE

Money Matters	\$49	
Money v4.0	\$27	
Tobias Checkwrite Plus	123	
Tobias Managing Your Money v 2.0	132	
Wealth Builder	46	
Wealth Starter	46	

GRAPHICS

Deluxe Paint II Enhanced	\$77	
Hot Shot Graphics	199	
PC Paintbrush IV	54	
PC Paintbrush IV Plus	\$106	
Printmaster Plus	32	

PRESENTATION GRAPHICS

Animator	\$220	
Corel Draw 2.0	385	
Dratex Ultra v 4.0	232	
Harvard Graphics	\$238	
Lotus Freelance Plus	311	

COMMUNICATIONS

Carbon Copy Plus	\$116	
Carbon Copy Plus Host	185	
CompuServe Membership Kit	199	
CrossTalk XVI	181	
CrossTalk Mail4	127	
Minor III v2.0	79	
Procom Plus	\$33	
Prodigy Start-Up Kit 3.1	25	
Remote 2 Complete Pkg	186	

PROGRAMMING & LANGUAGES

MS Basic		
Pro Development System	\$290	
MS C Compiler	299	
MS C++ Compiler	689	
MS Fortran Compiler	273	
MS Macro Assembler	91	
MS Pascal Compiler	189	
MS Quick Pascal	81	
MS Quick Basic	81	
MS Quick C	81	
Turbo C++	135	
Turbo Pascal Pro 6.0	189	

Where smart buyers find smart buys.

1-800-622-6659

CORPORATE ACCOUNTS • Call 1-800-752-0561

INTERNATIONAL ORDERS • Call (602) 944-0402/FAX (602) 944-1510

• How accepting International Orders.

• Call our FAX at (602) 944-1510

• International Orders Add \$5.

• Call Before Shopping P.R. & Ask for National Accounts.

• Personal & company checks will only shipping 3 weeks.

• Prices, terms, availability & specifications are subject to change without notice.

PCMS1491 • Add \$5 for C.O.D. R.P.G. & P.P.O. Orders.

• Mailing Address:

3804 N. 23rd Ave. Phoenix, AZ 85021

• In Arizona Call (602) 944-0402

• Order Line Hours: Mon-Fri 8am-10pm

Sat 8am-5pm Sun 10am-5pm

• Order Processing: (602) 944-1887

Visa-Mc-Master-Card

• Money Back Guarantee

Software ONLY

30 Days from date of invoice period

Refund ONLY on product price

Product must be in resalable condition

Call for return authorization number

Must be in original packaging

Software is the latest available version

ZEOS[®] '486

Now, You can unleash ZEOS '486 EISA

THE ZEOS '486 EISA

"ZEOS...performed best on our tests, and they offer the best overall packages!"

**—PC Magazine,
Editor's Choice**

"ZEOS speeds to the head of this pack of EISA systems!"

—PC Week

"The ZEOS '486 offers the best choice of all!"

—Computer Shopper

"Outstanding!"

—PC Magazine



EISA!

Power. Editor's Choice!

"A MUST FOR THE CORPORATE USER" — PC MAGAZINE



Unleash the power! Unleash your own ZEOS '486 EISA. *PC Magazine* calls it "outstanding." If it's your first '486, you will quite likely call it unbelievable. Believe it.

In awarding your new ZEOS '486 the coveted *Editor's Choice Award*, *PC Magazine* said the ZEOS '486 EISA was "best on our tests."

They went on to note the ZEOS '486 is "both surprisingly useable and affordable." But that really shouldn't come as a surprise. After all, this ZEOS '486 powerhouse comes from a family of *Seven* ZEOS Editor's Choice machines. Now let's talk real '486 power:

THE POWER OF EISA

It begins with the EISA bus. *PC Magazine* found that the 32-bit EISA bus when combined with our EISA disk caching controller will provide performance "easily twice as fast (and occasionally ten times as fast) as an AT-bus computer with the same microprocessor and megahertz rating." Now that's *fast*!

But what about compatibility? While the '486 processor offers full software compatibility, the EISA bus will accept your present eight and sixteen bit expansion cards and runs them without a hitch. That's the advantage of the EISA bus. Incredible performance with complete compatibility. That's your new ZEOS '486 EISA.

"TWEAKING AND REFINING:"

A ZEOS HALLMARK.

And, speaking of performance. In their *Editor's Choice* review, *PC Magazine* noted "ZEOS has a reputation for tweaking and refining that shows." That's the ZEOS way. Attention to detail really makes the difference. We're talking about important details, items

you may not even notice at first. Like two cooling fans in EVERY ZEOS '486. And cabinets Loaded with drive bays. Loaded too with 300 Watts of power and a motherboard that will take up to 32MB right on board. And more.

"SUPERLATIVE SERVICE AND SUPPORT"

"*Superlative Service and Support.*" That's what *PC Magazine* calls ZEOS' 24 Hour a Day Toll Free Sales and Technical Support program. We're here any time you need us—day or night.

And that's only the start of your ZEOS Customer Satisfaction package. Add to it our 30 Day Absolute Satisfaction Money Back Guarantee, One Full Year Limited Warranty and our Express Parts Replacement Policy. You're going to be very satisfied. We don't just say it. *We Guarantee It!*

ORDER YOUR ZEOS '486 EISA TODAY!

PC Magazine says the ZEOS '486 is "a must for the corporate user." Corporate or otherwise, the ZEOS *Editor's Choice* '486 EISA is the one for you. So why not pick up the phone and give us a call right now? Your own expert Systems Consultant is waiting here to help you tailor your new ZEOS '486 EISA just as you want it. Your absolute satisfaction is *Guaranteed!*

CALL NOW TOLL FREE

800-423-5891

DON'T FORGET THE OPTIONS!

ZEOS has them all. Starting with blazing 32-bit EISA cards and every other high performance option you could possibly want. On-site service is available too. Call 800-423-5891 for details.



**THE COMPLETE
ZEOS '486-25MHz
EISA DESKTOP!
128K CACHE, 85MB
DRIVE & MORE.**

ONLY \$3995

33MHz Only \$4995

- '486 25MHz (or 33MHz) CPU with built-in Cache and Math Coprocessor.
- High Speed 128K SRAM Secondary Cache.
- 8-32 EISA expansion slots. Also accepts 8-bit and 16-bit cards.
- 1MB of High Speed DRAM, expandable to a Total of 32MB.
- Ultra Fast 85MB IDE Hard Drive, Teac 1.2MB Floppy Drive.
- Genuine Hercules brand graphics controller. 14" High-Res Amber Display with Tilt/Swivel base.
- ZEOS/RS 101 key Space Saver Keyboard.
- ZEOS I/O Card with Two High Speed Serial plus Parallel & Game port.
- Full Weitek math coprocessor support.
- Rugged ZEOS 7-bay desktop case with 300 Watt Power Supply and two cooling fans for increased component life and system expandability.
- Wrap it all up with 24 Hour a Day, 365 Day per year Toll Free Technical and Sales Support on your ZEOS Hotline. You've got a winner!

**ORDER NOW TOLL FREE
800-423-5891**

FAX Orders Dial: 612-633-1325
Minnesota Call: 612-633-4591
TDD (Hearing Impaired) Orders
Call: 800-228-5389
Outside US and Canada Call:
612-633-6131
MasterCard, VISA,
Discover, Am Exp,
Z-CARD and COD.
Open 24 Hours a Day,
365 Days a year!

Purchase orders from Fortune 1000 companies, governments and institutions subject to approval. Leasing programs available. All prices and specifications subject to change without notice. Please call to confirm pricing, specification and warranty details. The following are trademarks of their respective corporations. ZEOS and Z-Card of ZEOS International Ltd. © ZEOS International Ltd., 530 5th Avenue, N.W., St. Paul, MN 55112 USA. ZEOS is a publicly traded company. NASDAQ symbol: ZEOS

CIRCLE 722 ON READER SERVICE CARD





Unfortunately, everyone working with your company's data may not be working with your company.

An unsecured PC is an open invitation to trouble. A competitor could steal your most sensitive information. Or a well-meaning employee could accidentally alter or delete important data or leave a virus behind. That's why you need DiskLock.™

DiskLock doesn't let anyone into your system without entering your password. It automatically locks your drive when you turn off your computer, and you can set it to lock when your PC has been idle for a time you've specified.

And when it locks, it locks. DiskLock lets

you choose from three levels of security, including the government standard, DES encryption. That's serious protection.

DiskLock works transparently, so you can work without interruption. You can lock only your drive, or you can lock your drive and individual directories or files. And it automatically records unsuccessful entry attempts.

You won't find better protection for your sensitive data.

To find out more about DiskLock, call 1-800-873-4384. Buy DiskLock now
CIRCLE 286 ON READER SERVICE CARD

and get a free locking diskette box. Just write "lock box" on the registration card and return it. This is a limited-time offer, so secure one today.



Fifth Generation Systems, Inc.
10049 N. Reiger Road, Baton Rouge, LA 70809
Technical Support: (504) 291-7283

William F. Zachmann



The Pen Isn't Mightier Than The Keyboard

Pen-based PCs are coming, but wait awhile before you throw away your keyboard.

Are keyboards about to follow the Dodo and the carrier pigeon into extinction? Is touch-typing soon to become as irrelevant to modern life as the buggy whip? Are pen-based computers poised to make conventional input devices as obsolete as the Model T Ford?

If the more wild-eyed enthusiasts of pen-based computing are correct, a tremendous revolution in technology will soon send the keyboard, touch-typing, and conventional computers into dim obscurity. It's easy to see why pen boosters might think so; handwritten input has a tremendous initial appeal. The prospect of communicating with a computer

in longhand is enormously exciting, especially to those who cannot touch-type and aren't all that keen on learning.

Before rushing to toss our keyboards into the trash, however, perhaps we ought to sit back, take a deep breath, and ponder the matter further. Learning to touch-type may not yet be as irrelevant to contemporary high school students as the more aggressive pen propagandists claim. After all, there have been lots of input technologies which seemed to sound the keyboard's death knell. Voice input comes to mind, as does Hewlett-Packard's touch screen—introduced with much fanfare in the middle of the last decade. So far, all of these exotic human/computer interfaces have failed to catch on.

The HP touch screen, when it appeared, was thought to have many of the virtues currently attributed to pen systems, and it, too, was prescribed as a medicine for "keyboard phobia." It was also a complete flop. Aside from the ugly cumulative effect of greasy fingers poking at the display screen, the touch screen suffered from a much more fundamental problem: However appealing it was in theory, it wasn't really very usable or very useful in practice.

Unlike HP's touch screen, which came (and went) in a relatively short time, voice recognition seems like it has been around, in a kind of

technological limbo, forever. Voice input has been a much touted technology on and off for nearly three decades now. It was already the subject of gushing press articles in the early 1960s, and has popped up from time to time since then. Its impact, however, has been only modestly greater than that of the HP touch screen.

The HP touch screen and voice recognition failed for different reasons, and neither can be seen as entirely predictive of the likely success or failure of pen-based computing. But the similarities and differences among these three technologies reveal much about the likely strengths and limitations of pen systems. Of the three, the touch screen was by far the least likely to succeed. It suffered from far more obvious weaknesses than do either voice or pen input devices. Two problems are of particular importance.

First, entering characters or numbers with the touch screen was much more cumbersome than even the slowest "hunt and peck" keyboard typing. While the touch screen supported relatively efficient selection of menu choices, the best it could do with character or numeric input was to put a keyboard or keypad



ILLUSTRATION: JOHN LARBE

image on the screen. It rapidly became evident that it was easier simply to use a keyboard or keypad in the first place.

Second, the inherent lack of precision in finger pointing severely limited the utility of the touch screen as a pointing device. Menu areas on the screen had to be rather large. Resolution simply wasn't adequate to support drawing or sketching on the screen, or even relatively simple operations like selecting text.

William F. Zachmann

The touch screen was far more clumsy as a pointing device than alternatives like mice or digitizing tablets.

A MEANINGFUL GESTURE

Pen systems undoubtedly offer major advantages over the touch screen. The far

greater precision in "reading" the position and movement of the stylus over the display tablet matches or exceeds the tracking accuracy of a mouse. Users can make movements fine enough to allow not only handwriting, but also accurate sketching or drawing. This precision makes it possible to incorporate what have come to be called "gestures" as a means of conveying commands to the computer. Pens al-

low gestures such as an inverted "V" (carat) to create an insertion point, or a line drawn through text to mark characters for deletion. Such gestures aren't possible with a mouse. Of course, pen-based systems also provide the ability to recognize printed and even handwritten text or numerals. Unlike the touch screen, a pen-based system does offer a possible alternative to keyboard input for word processors, spreadsheets, and other applications.

Whether or not these advantages are sufficient to make us all pen users, however, is brought into question by the very limited success of voice input. Despite its promise, and despite considerable improvements in technology over the past three decades, voice recognition hasn't really amounted to much in general use. Why? For one thing, the technology remains limited to relatively small vocabularies of discontinuously articulated words. Reliable recognition of continuous speech at an affordable cost remains elusive. Until this cost/benefit dilemma is solved, voice recognition will remain confined to limited use in specialized applications.

NOT QUITE THERE YET

In its current state, pen-based handwriting recognition is distinctly similar to voice recognition. While individually printed characters can be recognized with reasonable accuracy, the normal handwriting of most users isn't likely to generate an acceptable level of recognition. In order to be reliably understood by the system, one must print. That's nevertheless an enormous improvement over the touch screen and, in fact, provides a noticeably better solution than current voice recognition technology. But it remains an awkward and relatively slow way to enter text or numbers in everyday situations. It will do for short input strings, but is unlikely to be satisfactory beyond that for most applications.

The bottom line? While pen-based systems may prove successful in niche markets and with a minority of users over the next few years, they aren't going to have anything like the "revolutionary" impact currently envisioned by their enthusiasts. I strongly suspect that a 14-year-old high school student learning to touch-type today is gaining a skill that he or she will find very useful for many years to come.

"I Get Paid To Write Programs. And Now I'm Writing Them Twice As Fast."

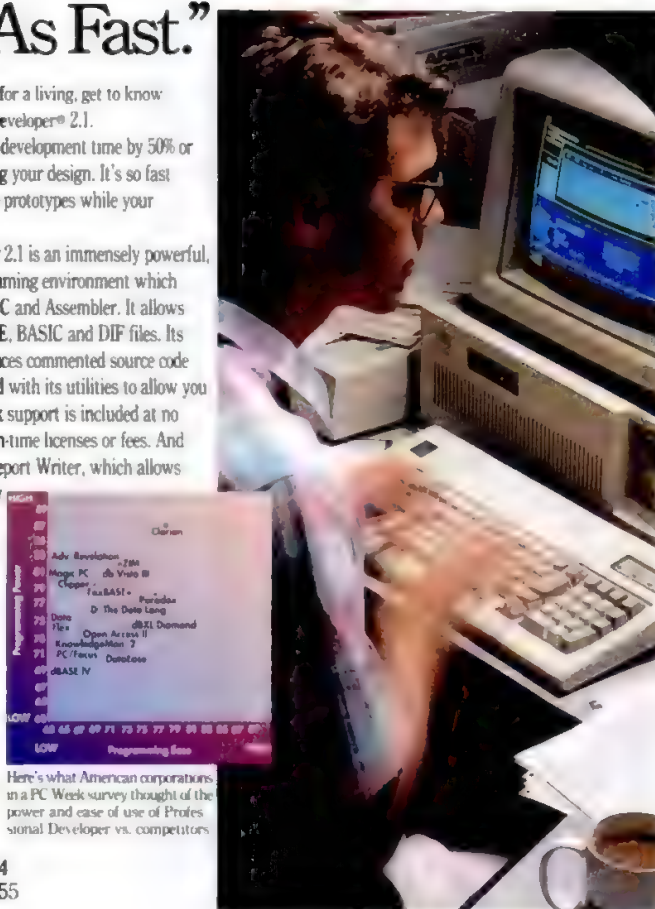
If you write programs for a living, get to know The Clarion Professional Developer® 2.1.

It can cut applications development time by 50% or more without compromising your design. It's so fast and easy, you can complete prototypes while your clients watch.

Professional Developer 2.1 is an immensely powerful, easy-to-use DBMS/programming environment which interfaces to routines from C and Assembler. It allows import and export of dBASE, BASIC and DIF files. Its application generator produces commented source code which can be easily adapted with its utilities to allow you to generate .EXEs. Network support is included at no extra cost. There are no run-time licenses or fees. And now Version 2.1 includes Report Writer, which allows you to easily and intuitively create ad hoc reports and queries (from Clarion files, non-Clarion files or any combination).

In this business where time is money, let Professional Developer help you generate more money for your time. Below is a partial list of our worldwide network of dealers. For the one nearest you, call:

(U.S.A.) 800-354-5444
(Canada) 305-785-4555



Here's what American corporations in a PC Week survey thought of the power and ease of use of Professional Developer vs. competitors.

CIRCLE 178 ON READER SERVICE CARD

CLARION SOFTWARE™

150 East Sample Road
Pompano Beach, FL 33064

AZ, Mesa
Computer
Warehouse
(802) 969-0909

CA, City of Industry
Soft Warehouse
(818) 913-3360

IL, Skokie
Soft
Warehouse
(708) 933-4700

N.J. Greenbrook
Connecting
Point
(201) 752-7773

PR, Naranjito
Micro Plan
Systems
(809) 869-1282

BC, Cranbrook
MLC Computers
(804) 489-2147

FL, Ft. Lauderdale
Software Cellar
(305) 563-0333

IN, Indianapolis
Software City
(317) 577-3749

OK, Tulsa
Computer Mart
(918) 459-0002

TX, Houston
Computer Post
(713) 870-0513

Clarion Software Products run on any IBM PC, PS/2, or true compatible with 512K of memory and a hard disk. Clarion Professional Developer is a registered trademark and Clarion Software is a trademark of Clarion Software. Copyright 1989 Clarion Software. dBASE is a registered trademark of Ashton Tate.

CIRCLE 178 ON READER SERVICE CARD



YOUR HARD DISK.



YOUR HARD DISK WITH STACKER.

If you need more megabytes than your hard disk can swallow, don't buy a new drive. Stretch it with Stacker.

Stacker is the fastest, most economical way to safely double your hard disk capacity. Without sacrificing DOS compatibility. It's the new standard in real-time data compression.

- Increase storage 100%
- Compatible with DOS 3.x, 4.x
- Industry's fastest real-time data compression
- Includes disk caching
- Fastest, easiest installation
- Toll-free technical support
- 90-day money-back guarantee

And it's the only product of its kind available in both software and coprocessor versions.

Stacker is fully compatible with Windows 3.0 and all your favorite disk utilities, too. Plus, Stacker includes a powerful disk caching program for added performance.

And when you add the Stacker coprocessor card you also get the fastest data compression in the business.

No wonder there are already over a million satisfied users of Stac's compression technology.

So call today and double your disk capacity tomorrow. You can purchase the Stacker software-only version—perfect for laptops—for only \$149. Or get the entire Stacker high performance system with software and coprocessor card for just \$229.

Order today. Visa, MasterCard, American Express cards accepted.

1-800-522-7822

Or see your local computer/software dealer.

STACKER™

© 1990 Stac Electronics, Carlsbad, CA
Stacker is a trademark and Stac a registered trademark of Stac Electronics



Cache Conscious.

Powerful 386 ∇ 25 Cache System.

- ☐ 128K cache memory expandable to 256K
- ☐ 4MB of 32-bit high speed memory expandable to 16MB on-board
- ☐ High performance 1024 x 768 VGA with 256 colors including 1MB of 32-bit video memory
- ☐ 14" Super Hi-Res .28mm dot pitch VGA color monitor with tilt/swivel base
- ☐ 100MB 17ms IDE hard drive with 64K "look ahead" cache buffer
- ☐ 1.2MB 5.25" & 1.44MB 3.5" floppy drives
- ☐ Six 16-bit expansion slots available
- ☐ MS DOS 4.01
- ☐ Windows 3.0 & Hi-Res mouse

\$2595



If you crave power, speed, and flexibility, this is it. Our 386[™] systems have 128K cache, 4MB of 32-bit RAM and super fast processing speed. You'll power through the new multi-tasking programs

with ease. And, with our 100MB hard drive and 64K "look ahead" cache buffer, you can load in all those programs you've been collecting.

The Most In Reliability, Service & Support.

- | | |
|--|---|
| ☐ Fully integrated system board includes I/O controller, cache, RAM expansion, video controller, and drive controller | ☐ 30-day, no questions asked, money-back guarantee |
| ☐ System board designed and made in U.S.A. by Standard Computer | ☐ One year parts and labor warranty |
| ☐ FCC class B approved | ☐ Free one year on-site service in qualified areas |
| | ☐ Lifetime toll-free customer service hotline |

Call About Our Other 486, 386, SX & 286 Systems.

All this power and performance is displayed on a crisp Super VGA screen capable of creating images in 256 beautiful colors.

For more power, upgrade the cache memory to 256K, add a coprocessor, boost on-board RAM to 16MB or expand hard disk



Cash Conscious.



Affordable 386/SX-20 System.

- ☐ 4MB of high speed memory expandable to 8MB on-board
- ☐ High performance 1024 x 768 VGA with 256 colors including 1MB of 32-bit video memory
- ☐ 14" Super Hi-Res .28mm dot pitch VGA color monitor with tilt/swivel base
- ☐ 40MB IDE hard disk drive
- ☐ 1.2MB 5.25" & 144MB 3.5" floppy drives
- ☐ Four 16-bit expansion slots available
- ☐ 1 parallel and 2 serial ports
- ☐ 101-key enhanced keyboard
- ☐ MS DOS 4.01
- ☐ Microsoft Windows 3.0 & Hi-Res mouse

\$1795

capacity to a gigabyte.

On the other hand, if you're looking for the perfect

800/662-6111



blend of price and performance, try our 386/SX. With high resolution VGA, highly integrated system board and zero wait state memory, this system is not only affordable, it's powerful.

With 2MB of RAM, expandable to 8MB on-board, and a 40MB IDE hard drive, our 386/SX systems can

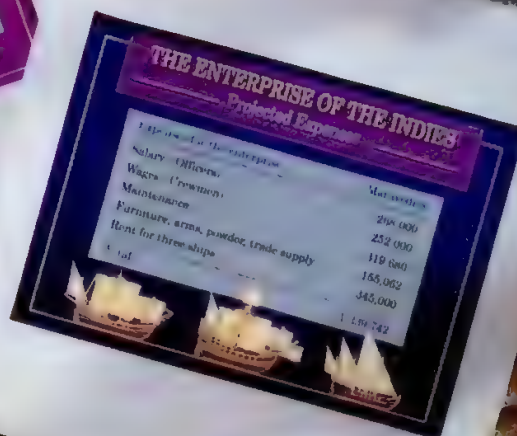
easily handle the latest software. DOS and Windows are preloaded and a high resolution mouse completes the package.

All systems carry a 30-day, no questions asked, refund. Plus one year parts and labor warranty. On-site service in qualified areas and our toll-free customer service hotline are included at no extra charge.

So, if you're cash conscious or cache conscious, give us a call. We'll fit you with a system, fast. It's just the Standard thing.

STANDARD
COMPUTER

12803 Schabarum Avenue, Irwindale, CA 91706
Phone: 818/337-7711 FAX 818/337-2626
CIRCLE 163 ON READER SERVICE CARD



Picture What Columbus Could Have Done With DrawPerfect 1.1.

Columbus had a rather far fetched—though far reaching—idea. He wanted to go east by going west. Not the easiest concept to get across, even in the enlightened era of the Renaissance.

With DrawPerfect® 1.1, Columbus would have discovered a remarkably easy, yet powerful way to present his ideas. With DrawPerfect, he could have hot-linked to PlanPerfect®, Lotus 1-2-3, Quattro Pro, or Excel, and created up-to-date graphs and charts for slides, transparencies and on-screen slide shows.

Then, by simply selecting "WordPerfect" from the pull-down menu, he could have jumped between

DrawPerfect and WordPerfect to create professional looking handouts.

DrawPerfect version 1.1 includes 30 fonts

and over 500 clip art images that could have spiced-up his presentation. And with DrawPerfect's other new features like *trend analysis*, prospective backers quickly would have seen the venture's potential profits.

Since DrawPerfect now comes with a runtime module, Columbus could have taken his show on the road. Or the high seas. Of course, had he ever found himself in uncharted waters, the industry's best technical support is only a toll-free call away.

Explore DrawPerfect 1.1 for yourself. For a demo disk, upgrade information or a free brochure, call (800) 526-5052. Who knows? You may discover a whole new world.



On screen presentation

WordPerfect
CORPORATION

1555 North Technology Way, Orem, Utah, 84057
Tel: (801) 225-5000 FAX: (801) 222-5077

DrawPerfect and WordPerfect are registered trademarks of WordPerfect Corporation within the United States and other countries. All other brand and product names are trademarks or registered trademarks of their respective companies. ©1991 WordPerfect Corporation.





Power Presentations: A New, Colorful Era

by Rock Miller

Better software and cheaper hardware make color a practical option for business presentations.

With the ubiquity of PC-based graphics, the typed or handwritten overheads and hand-drawn charts of old have become rare in business presentations. Yet the vast majority of presentations, industry watchers agree, are still based on black-and-white overheads and laser-printed handouts. Though color slide shows don't require the expensive services of professionals anymore, they still tend to be reserved for only the most important of occasions, where making the best impression is critical.

Yet there are plenty of good reasons to use color even for everyday purposes. Color presentations are more impressive, certainly, but they're also much more understandable. Color delineates elements more sharply, replacing obscure and cluttered hatch patterns, for example, with distinctly colored objects. And, as graphics expert Edward R. Tufte convincingly demonstrates in his subtle and brilliant book, *Envisioning Information* (Graphics Press, 1990), color can be used with enormous effectiveness to increase the

essed outlines and data-packed spreadsheets, make it easier for time-pressed business people to generate presentations quickly.

Improvements in the use of color are equally marked. In place of the crude 16-color schemes of old, today's packages take full advantage of PC video technology, offering palettes of 256 or even 16.7 million colors, all fully customizable to the needs at hand. Such a wide color range

may seem like overkill, but as soon as you see how these capabilities can improve your images through subtle distinctions in color instead of violent contrasts, you'll be hooked. The ability to apply color gradient fills to backgrounds and import color bitmaps lets you create professional looking results. And such

improvements as templates for producing images in the right aspect ratio for slides, as well as direct support for a wide variety of color output devices (from color PostScript printers to film recorders) let you take full advantage of the color facilities you have at hand.

Increased artistic power doesn't mean increased artistic talent, however. With a methodical approach and some experimentation, anyone can develop enough of an artistic eye to get by. But making your presentations unique requires attention-getting images, and these aren't easy for the nonartist to produce. That's where clip art comes in.

HELP FOR THE IMAGINATION

Most presentation graphics programs offer a selection of vector clip-art images as part of the package, along with the tools to manage at least the basic manipulations of resizing, placement, and coloring. But in a sense you get what you pay for: The quality of clip-art images tends to vary, to put it charitably, and although most collections do pretty well on generic borders, symbols, and dingbats, you'll find yourself coming up empty if you're looking for anything distinctive.

Fortunately, there's now a good range of stock art available in electronic form. In fact, a whole industry has arisen to provide a never-ending stream of images, many of them quite good. Unlike their

paper-based counterparts, these can be edited, recolored, combined, and customized almost infinitely to achieve exactly the individual effects you want. Our second story, "Clip Art," reviews 18 of these clip-art libraries in EPS, CGM, or proprietary vector formats, many offering over 1,000 images each. To help you assess which libraries will best serve as grist for your imagination, the reviews pay as much attention to the way the objects making up the images are organized as to the artistic quality of the images themselves.

Another way to get eye-catching images is to scan them. 24-bit color scanners with 300-dot-per-inch resolution are now available for less than \$3,000; look for a review of these scanners coming up in a summer issue of *PC Magazine*. PC-based video capture boards, which work well with ordinary consumer camcorders, provide an alternate source of such images. And if you need anything really elaborate, you can incorporate super-high-resolution Targa images produced by professional artists. Though these are generally less useful than vector images that can be rescaled and rotated, as well as recolored and reconfigured to fit, they work well as photographic backgrounds or as insets.

GETTING IT ON PAPER

None of this would do any good if there weren't an equally practical way to get color output. Fortunately, you now have a wide range of color output options to suit your needs and pocketbook. All graphics packages support the most common monochrome and color printers for producing handouts, flip charts, and reports quickly and easily. And where quality is an issue, the same network of service bureaus and procedures that supports color publication can be used for paper-based presentations through the standardized medium of color PostScript.

Software and service innovations have also made color slides much easier to produce than formerly. Almost all the graphics packages we reviewed have special arrangements with one or more slide service bureaus that can produce slides directly from the native graphics files. Often, these services come with custom communications packages that make ordering and transmission a simple procedure and let you specify transparencies or prints as well. The slides simply show up on your doorstep a few days later,

You now have a
wide range of color
output options to
suit your needs.

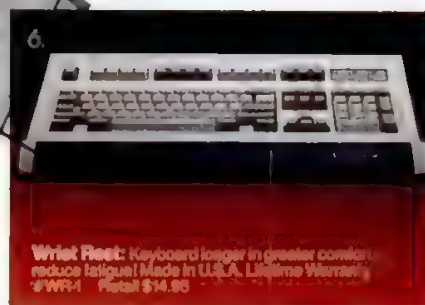
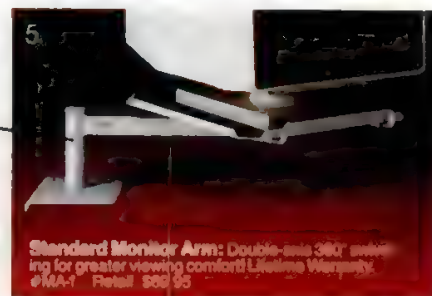


information density and clarity of your images. Color lets you say more with less.

Today's graphics software makes the use of color accessible to anyone with a PC and the willingness to learn a few basic skills. A whole range of newly affordable color output devices also makes using color more practical as well: Hewlett-Packard's PaintJet, for example, can be bought for under \$1,000, and national slide service bureaus can produce slides overnight for as little as \$10 each plus shipping. Today, there's no excuse not to use color in your presentations. And this special issue of *PC Magazine* is here to help you put together the tools you need to do it.

THE SOFTWARE KEYSTONE

As you'll find in our cover story—a roundup of 14 presentation graphics packages for the PC—graphics software is poised on the brink of an entirely new level of utility. From awkward, character-based menu systems that required frequent switching between modes, graphics software has evolved toward all-graphical interfaces in which objects can be added and modified by direct manipulation on a WYSIWYG display. The incorporation of high-quality scalable fonts and sophisticated vector drawing tools makes for crisp, professional-looking word charts and annotations. And better links with other software, via word-proc-



Improve VDT Safety Conditions

Six simple steps you can take.

At Curtis, we've been saying it for years. In San Francisco, it's the law. Use ergonomic accessories to improve computing comfort and safety.

1. Relieve eyestrain and fatigue, cut glare 95%, and absorb 98% of VLF radiation with Curtis Glass Filter Plus.
2. Relieve tired, aching wrists and organize your desktop with the Curtis Keyboard Organizer.
3. Keyboard at a more comfortable height—install a Curtis Keyboard Spacesaver.
4. Reduce eye fatigue—use a Curtis Clip to hold copy

and eliminate constant refocusing from desktop to monitor.

5. Position and adjust monitor to optimum viewing angle with a Curtis Monitor Arm—arm and platform both swivel 360°.
6. Support wrists at a more comfortable height and reduce fatigue with a Curtis Wrist Rest.

Don't take chances with your health and safety—start using Curtis accessories today. Write or call for your FREE "Tips to Computing More Comfortably" brochure.

For the Curtis dealer nearest you call (603) 532-4123 Ext. 871

Manufacturing Company, Inc.

CURTIS

COVER STORY

PRESENTATION GRAPHICS

along with a bill that can range from \$5 (for the cheapest local bureaus) to \$20 (for same-day super-rush service) per slide, plus shipping or courier fees.

To help you pick the right service, our feature "Slide Service Bureaus" evaluates the output and performance of five national service bureaus that have custom communications links with the presentation graphics packages we reviewed. There's also a sidebar on using local bureaus, in which we tested a selection of local service bureaus in the New York area and give you tips on how you can use such local services to save money.

Thanks to hardware improvements, creating your own slides is now a viable option. The film recorders that slide service bureaus use cost upwards of \$10,000 and often average \$40,000 or more; they are complex to operate and service. But you can now get far smaller and simpler models suitable for operation at a business site for as little as \$4,500. These let you produce both conventional and instant 35-mm. slides in-house, with all the control and security that such privacy represents. Though they're not for occasional presenters, film recorders are useful for those who generate enough slides to make the investment worthwhile. See our reviews of film recorders for an evaluation of the strengths—and limitations—of these units.

TRANSPARENT ALTERNATIVES

Better hardware makes it easier to produce the larger 4 by 5 and 8 by 10 transparencies as well. The Polaroid Digital Palette CI-3000 film recorder, for instance, comes with a camera back for making instant 4 by 5 transparencies; the company even throws in a small stand that fits on top of a standard overhead projector. The entire assembly offers an intriguing and highly portable color alternative to boring black-and-white overheads.

Although 8 by 10 transparencies can be expensive if produced by a service bureau, color PostScript printers (with prices under \$10,000) make it easy to produce them in-house. While their low resolution of 300 dots per inch makes them less effective for large audiences, they are supremely suited to small corporate presentations.

All the above output solutions represent better ways to do what has been done before. But the profusion of powerful

laptops has already delivered a serious challenge to the older, static media, in the dynamic medium of your PC screen.

THE PC AS PRESENTER

Almost all presentation graphics packages offer some sort of screen-show feature for viewing and practicing your completed presentation. With the addition of transition effects and attractive screen fonts, this screen-show feature becomes a presentation medium of its own, with its own particular advantages. Runtime modules, which make it possible for you to carry your presentation on a

Hardware improvements make it easy to create your own slides.



disk and run it on any PC, also open up limited possibilities for making your presentations interactive. Both the latest version (2.3) of *Harvard Graphics* and Borland's *Quattro Pro* let you build linked presentations that you can navigate by clicking the mouse on hot areas of the screen. And specially designed PC-based presentation packages (see the sidebar "Beyond the Screen Show: PC-Based Presentation Packages") go well beyond sequencing static images; they encompass sophisticated branching and looping, simple animations, and even audio and video support.

Few portables have color screens, but if your destination is reasonably well equipped, you should have no problem delivering a presentation. For small groups, you can usually scare up an ordinary VGA monitor. If not, you can bring along a portable color-LCD panel that, placed on top of an ordinary overhead projector, lets you project a (somewhat washed-out) color image on a wall or screen. Large auditoriums are now starting to come equipped with so-called data projectors, which are similar to the projection television sets often seen in bars but accept computer images instead.

Perhaps the best dynamic solution for

in-between groups is large-screen display monitors (see the article "Presentation Monitors" in this issue). Ranging from 25 to 40 inches or more, these are perfect for conference-room settings; in fact, *PC Magazine* has two of them for just this purpose. Since they accept composite signals—audio as well as video with VGA resolution or better—they're useful for showing videotapes as well. No well-equipped conference room should be without one.

Finally, for the ultimate in portability, check out the General Parametrics Video-Show or one of its imitators. These highly portable units let you store your presentations as bitmapped images on an ordinary floppy disk and display them on a video monitor. They offer a range of transition effects, similar to what you get with PC-based screen shows.

Ultimately, PCs running presentation software will metamorphose into multimedia delivery systems that present sound, animation, and still graphics. Though at present multimedia is more a concept than a useful market, you can already see the beginning of the future as people use VGA-to-NTSC boards to put existing screen shows into the more portable form of videotape—and as vendors of PC-based presentation packages such as IBM's *Storyboard Live!* start incorporating support for digitized video in their packages.

The most recent news in PC multimedia has centered on Microsoft's definition of a standard delivery platform based on CD-ROM technology, VGA graphics, and digital audio. Tandy, Zenith, and IBM—along with a host of unannounced players—are already working on multimedia computer systems that integrate these elements. Other trends mark the slow but steady progress in the field: A rash of so-called multimedia boards that incorporate both sound and video, *Windows 3.0*-based versions of multimedia authoring packages, and the beginnings of useful compression technology, as evidenced by the evolving JPEG standard for still images and video frames and by Intel's DVI technology for real-time digital video.

In time, these tools will mature enough so that mainstream business people can use them in creating dramatic interactive presentations. Until then, there's plenty you can do to improve your presentations with today's technology. ■

Power Packed & Built To Last.



XT/SLIM

STANDARD 150 \$69

Economical This UL approved, fully tested unit is one of the best generic 150s available. Ideal for basic systems.

SILENCER 150 \$119

Ultra-Quiet Stop that irritating noise with the Silencer 150. Its large, low speed, German fan keeps your system 5° to 15° cooler and 84% quieter. Virtually inaudible! Great in the executive suite or home office.

TURBO-COOL 200 \$169

High Performance Put AT power and 200% more cooling under the hood of your PC/XT with our UL approved Turbo-Cool 200. Its patented twin fan, sloped-cover design keeps your system 30° to 45° cooler, preventing data errors and other heat-related problems. Perfect for hot rod PCs and Mini ATs!

TURBO-COOL 275 \$169

Slim and Powerful Give your Slimline or Mini-Tower computer up to 100% more power and cooling with our low profile, direct replacement Turbo-Cool 275. With a peak capacity of 350 watts, it will easily start even the largest hard drives and peripherals!

Silencer, Turbo-Cool, and InnerSource are trademarks of PC Power & Cooling, Inc. Compaq and Deskpro are registered trademarks of Compaq Computer Corporation.



AT/TOWER

STANDARD 220 \$99

Economical This UL approved, fully tested unit is one of the best generic 220s available. Ideal for basic systems.

SILENCER 220 \$139

Ultra-Quiet Unrattle your nerves with the Silencer 220. Its high-efficiency, adjustable-speed fan offers 69% less noise with standard cooling. Quieter than most hard drives. Great in the executive suite or home office.

TURBO-COOL 300 \$189

High Performance Upgrade your AT/386 with our powerful Turbo-Cool 300. This popular OEM unit features built-in line conditioning, UL/CSA/TUV approval, 2 year warranty, and a high-capacity, adjustable-speed fan that keeps your system 20° to 35° cooler for up to three times longer life. Great value!

TURBO-COOL 450 \$349

Maximum Performance The choice of PC professionals, our Turbo-Cool 450 features built-in line conditioning, autoselect input, independent regulation, external DC voltage adjustment, triple-stage output filter, 50cfm cooling fan, UL/CSA/TUV approval, 200,000 Hr. MTBF and 2 year warranty! Ideal for high-end workstations and network file servers.



COMPAQ

CP160 \$169

Original Portable Upgrade Double your power with our direct replacement CP160. Allows 286, 386, and hard disk upgrades.

CD270 \$249

Deskpro Upgrade The power user's power supply! Our direct replacement CD270 gives your 8086/286/386 Deskpro up to 70% more power and the reliability it deserves. Prevents nuisance rebooting. Advanced design includes autoselect 110V/220V. 2-year warranty.

The Winner's Choice.

The competition for PC Magazine Editor's Choice award is fierce. To win, computer manufacturers must submit systems that are assembled with only the best, most reliable components. That's why more winning entries are powered by a PC Power & Cooling unit than any other power supply.

You can improve the performance of your computer as well. Be sure to ask for a PC Power & Cooling unit by name in your next new computer or think of us when you need a replacement power supply.

Most orders shipped same day. We accept Visa, MC, COD or PO on approved credit.

CIRCLE 482 ON READER SERVICE CARD

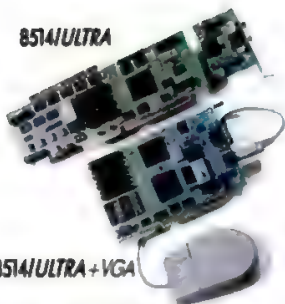
PC POWER & COOLING, INC.

31510 Mountain Way, Bonsall, CA 92003 • (619) 723-9513 • (800) 722-6555 • FAX (619) 723-0075

A list of all the things you can do waiting for ATI's new 8514/ULTRA to open Windows.

① BLINK

8514/ULTRA



8514/ULTRA + VGA

Don't blink now! Keep both eyes open or you may miss the revolutionary new way of looking at Windows.*

For openers, nothing matches the 8514/ULTRA† for speed. Other cards claim they're fastest, but don't let them pull the wool over your eyes.

The 8514/ULTRA runs Windows 24 times faster than Super-VGA cards*. And five times faster than TI 34010† cards*. It has the power to deliver 386 graphics performance on a 286 machine, and then some. So you don't have to spend big bucks to upgrade your system, when the 8514/ULTRA does more for a lot less.

Like nothing you've seen before.

The 8514/ULTRA delivers high resolution and eye-popping detail. With 70Hz non-interlaced display, flicker-free graphics come alive in brilliant 1024x768 resolution, and up to 256 colors.

True laser print for the screen.

Everyone talks about WYSIWYG. Only the 8514/ULTRA delivers it. ATI's remarkable CRYSTAL Fonts† scale and display Windows text in true laser quality – right on the screen. That's equivalent to 3200x2400 resolution! So even type as tiny as 6-point is clearly legible. Don't waste time and money printing and proofing page-after-page. The 8514/ULTRA lets you do it accurately on-screen.

Plus, it's register compatible with IBM's 8514/A† and software compatible with XGA† cards. And with our innovative "Flippy" design, you get Micro Channel† and AT-bus support on a single card.

The 8514/ULTRA is also available with an integrated VGAWONDER+† controller and Microsoft† compatible bus mouse.

Why not let the 8514/ULTRA open new Windows of productivity – in the blink of an eye.

Priced from \$599.**

Join us at Windows 1991
R/E/C SYSTEMS**91
May 8-10 Washington, DC

See us at
WINDOWS WORLD 91
The Official Conference and Exposition for Windows Computers
 Booth 2544 May 23-25, 1991 *Atlanta, Georgia

For more information,
contact your supplier, or:

ATI Technologies Inc.
3761 Victoria Park Avenue
Scarborough, Ontario
Canada M1W 3S2
Tel: (416) 756-0718
Fax: (416) 756-0720



ATI's Family of Products includes: VGAWONDER+ • VGAEDGE-16 • VGBASIC-16 • 9600etcl/e • 2400etcl/e • 2400etcl/i

*Average speed based on PC Magazine's WINBENCH V1.1 Windows benchmark test. Results available upon request. **Suggested retail price for 512K model. 1MB versions also available. Dealers may sell for less.
Copyright © 1991 ATI Technologies Inc. † Trademarks are registered by their respective companies.

CIRCLE 540 ON READER SERVICE CARD



Presentation Graphics

by Luisa Simone

Creating the perfect presentation is rarely quick or simple, but with the right presentation package, the time you do spend will be productive and creative.

Here *PC Magazine* looks at 14 business graphics packages designed to help you produce snappy slide and overhead presentations.

The ease with which audiences become bored is just an anecdotal fact, until you find yourself alone on a darkened stage with one simple word chart, a 10-minute monologue, and the unnerving sense that someone out there is falling asleep at every word. Being a successful presenter means learning how to edit, structure, and illustrate your concepts in order to inform, influence—and entertain—your audience. You have to be part editor, part art director, and part showman. And that's not easy.

It isn't enough to rely on the impact of punchy headlines, for example. Because larger typefaces have greater visual impact, you have to be willing to edit your message so that just a few words convey your meaning. Consistency is a virtue, but so is knowing when to break the rules—sometimes, departing from your format can help an audience follow a valuable digression within a complex presentation. And a comprehensive multicolumn table of corroborating data that would ordinarily overwhelm your material can be an enhancement if you supply it as a handout afterward.

These strategies are not in and of themselves computer-specific, but your presentation graphics program can make acquiring and implementing them either easy or difficult. Fiddling with headlines is less frustrating when you can edit text and its attributes directly on the screen—and when using quality scalable fonts gives you a clear idea of what you're placing where. Using progressive builds (where successive points in an outline are highlighted in sync with the speaker, creating a pseudo-animated effect) is far easier if your program makes it easy to copy and alter slides. And editing numerical data for greater effectiveness goes a whole lot faster if you don't have to exit to your spreadsheet program to do it.

BUILDING A BETTER YARDSTICK

The 14 presentation graphics programs reviewed in this issue are designed to give business people the tools they need for creating complete presentations. All let you create formatted word charts and data-driven business charts. All have built-in drawing tools that let you design diagrams and annotate charts, and all import vector graphics files that you can use to apply logos or clip art to your images. Moreover, all of these packages let you produce your presentations on 35-mm. slides as well as on laser printers, and all export charts and drawings to common file formats so that you can incorporate them into word-processed or desktop-published documents.

Despite their shared goals, these products show real differences in design. The latest ones use the power of *Microsoft Windows* or *OS/2 Presentation Manager* to give you an integrated environment for manipulating entire presentations, complete with speaker's notes and audience handouts; these include *Microsoft PowerPoint*, *Computer Associates' CA-Cricket*

Presents, and *Lotus's* redesigned *Freelance Graphics for OS/2*. Two other *Windows* products, *Micrografx's Charisma* and *Zenographics' Pixie*, offer a somewhat less integrated graphical environment, as does the GEM-based *Presentation Team* from Digital Research. And if you're not ready to take the plunge, there

A successful
presenter edits
and illustrates
concepts to inform
and entertain.

are still plenty of DOS programs to choose from—from market leaders *Harvard Graphics* and *Freelance Plus* to the recently upgraded *DrawPerfect* and *Applause II*, as well as enhanced versions of yesterday's *Kinetic Words*, *Graphs & Art* and *35mm Express*.

We chose not to include high-end packages like *Zenographics' Mirage* in this roundup because they are used by only a relatively small group of professional slide presentation artists. (Professionals also use drawing packages like *CorelDRAW* or *Designer* to create highly designed slides for paying customers.) However, we did review two packages, *ImageStation* and *Presentation Express*, aimed at corporate graphics departments. At \$700 to \$800, these programs carry a higher price tag than the \$495 or less you'd pay for most of the other programs reviewed here. In return they promise richer color options and special functions, like the ability to incorporate high-quality bitmapped images into your visuals, though these benefits aren't always evident in practice.

EVERYTHING CHANGES

When you're thinking of the best presentation software, the most important question to ask is not "How easy is it to create a presentation?" but "How easy is it to change it?" Only powerful, easy-to-use editing tools can encourage you to make

the author alterations, the design tweaks, and the exceptions to the rules that transform a merely respectable presentation into a great show.

Focusing on editing rather than creation can really change the way you evaluate a product's feature set. Programs that create speaker's notes and audience handouts automatically, for instance, don't save you work just once. By letting you change the order of the images or add a new slide without completely recasting the documents, they save a lot of work every time you give the presentation. Similarly, other convenience features such as master slides, template designs, and global color schemes make it easy to change the look and design of an entire presentation in one fell swoop. *Microsoft PowerPoint*, *Freelance Graphics for OS/2*, and *Aldus's* upcoming *Persuasion for Windows* are the front-runners in this new trend, which emphasizes the creation of entire presentations rather than isolated single images.

MASTER OF CEREMONIES

For those of you who have resisted *Windows*-based applications, there is some good news. DOS programs such as *Applause II* and *Presentation Team* have adopted some type of master slides. Master slides have a single overriding purpose: to enforce visual consistency between multiple slides in a presentation. Sorting through the various programs, however, reveals that each one implements master slides in a different way. In fact, many programs use different names to talk about masters: Some call them backgrounds, others call them slide masters or templates.

Many programs let you apply common backgrounds that include fills, logos, borders, and other elements that you want to appear on all visuals. Some, like *CA-Cricket Presents*, also let you use style sheets or templates to format the data specific to each slide. Since all of the design factors, such as type size, style, and legend placement are applied to incoming information, changing the appearance of the slide is a simple matter of applying a different style sheet.

The most sophisticated packages make it possible to reformat an entire presentation with just a few operations. *PowerPoint*, for instance, uses a master slide that not only endows your visuals with repeated elements but also defines a global color scheme and global text attributes, any of which can be changed simply by

SAVE THE MONEY AND RUN

PERSONAL R:BASE™ SIMPLICITY AND RELATIONAL DATABASE POWER FOR ONLY \$99.

Personal R:BASE gives you more features and faster results than any other stand-alone PC database.

Simply put, it's the best value on the market today.

Priced at just \$99 for a limited time, Personal R:BASE is the only database delivering both relational power and ease of use. That means greater productivity.

Easy-to-learn, easy-to-use cascading menus actually guide you through operation, prompting your every move. You also get a comprehensive on-line tutorial and free telephone support.

Relational power is another key to data management productivity. With Personal R:BASE you can immediately create your own special applications and screens—all without programming. You'll also find five free, ready-to-run applications to manage everything from your home finances to mailing lists.

Plus you can read and write dBASE III™ and III+™ files, as well as import spreadsheets and text data.

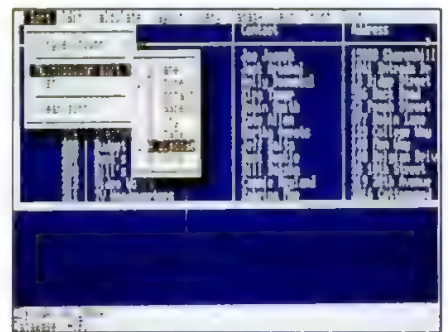


The greatest value for your money. That's what you get from Personal R:BASE. And it's all backed by Microrim, the developer of R:BASE 3.1, with over 650,000 satisfied users.

Relational power and simplicity, with a \$99 price and money-back guarantee. It's easy to see why Personal R:BASE is the runaway success.

With our easy, pull-down menus, you'll quickly query, sort, report and manage your data—no programming or commands are required.

PC Database Features	Personal R:BASE	Paradox	Q&A
Easy-to-use, pull-down menus	✓		
QBE: Query by Example	✓	✓	
Relational: supports connection of multiple data files	✓	✓	
Quick input form generator	✓		✓
Full on-line tutorial	✓		✓
Directly reads and writes dBASE III and III+ files	✓		
Imports and exports spreadsheet data	✓	✓	✓
Free applications included	✓		
Typical selling price*	\$99	\$470	\$250



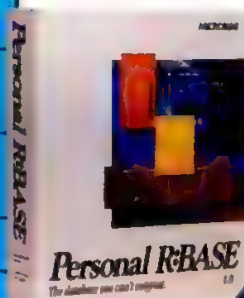
See your local dealer or:

ORDER NOW
800-248-2001

Ask for operator #21 7am to 5pm Pacific Time

MICRORIM®

*March 1991: Full product discounted selling price
Product names are trademarks of their respective companies.



PREVIEW OF COMING ATTRACTIONS: Persuasion and Freelance Graphics for DOS Stretch the Envelope

by Luisa Simone

When it comes to presentation graphics, procrastination might just be a virtue. Though there is always a new product promising greater functionality right around the corner, the presentation graphics market looks to be more active than usual in the upcoming year. New products are expected from Lotus, Aldus, Software Publishing, and a number of others.

We were able to get a look at two soon-to-be-released programs while they were still in the prerelease stage. While Aldus's *Persuasion* for Windows and *Freelance Graphics for DOS* are diametrically opposed in intent, both redefine the features and functions you may expect in their respective categories.

OUTLINING A CONCEPT

If you've shelved your purchase plans until a PC-based version of *Persuasion* becomes available, you're an old hand at the waiting game. Rumors about *Persuasion* running under Windows have been floating around for about two years. Despite the lead time this has given the competition, *Persuasion* is still one of the most innovative graphics packages around.

What makes *Persuasion* unique is its fully integrated outliner, which defines the structure of the presentation. *Persuasion* outlines are fully object-oriented. In addition to text, they contain icons that are dynamically linked to the slides in your presentation. Any actions you perform in the outliner, like typing copy, automatically affect the slide—and visa versa. You can even import spreadsheets and open up *Persuasion*'s internal data sheet from within the outliner.

In a similar vein, the icons available on the Outline menu are active elements that you can use to format the appearance of your slides. More subtle—and powerful—icons let you insert breaks in order to force copy to a new text block, making it easy to create double-column word charts right from the outliner. You can even designate dependent (or child) slides. Though the titles of the dependent slides appear in the outline only

once, *Persuasion* will automatically create a parent slide that functions as a table of contents and includes the headline for each child slide. You can easily assemble an entire presentation from within this text-based module.

Anybody comfortable working with a WYSIWYG screen has nothing to fear with *Persuasion*. A simple click on one of the four icons that run along the right side of the screen switches you into the more familiar slide sorter or drawing screen view of your presentation. You can also select a speaker's notes view.

The drawing screen is where you do most of your slide editing. *Persuasion*'s masters are not simple-minded backgrounds that are turned either on or off. Each *Persuasion* presentation contains multiple masters—one for free-form text, for example, and another for a double-column bullet chart. A horizontal bar chart might have a different master from a pie chart, but masters can also share a common background that contains objects like company logos, rules, and directional gradient fills.

MASTERS AND MASTERPIECES

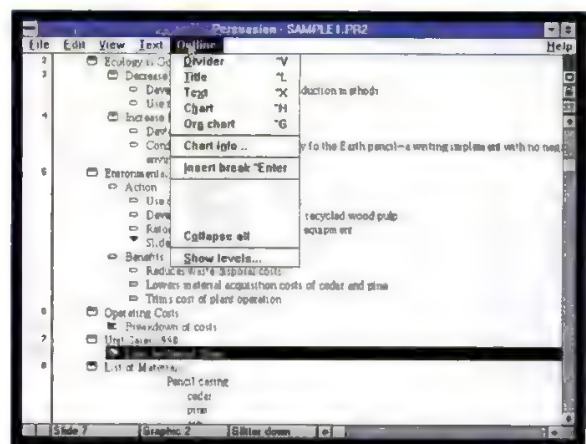
Persuasion's way of grappling with the distinctions between slide masters and master backgrounds is only one indication of its complexity. Since *Persuasion* recognizes two kinds of text, text insertion has its own nuances. Copy that is interactive with the outliner and works with the master templates must be entered in a formatting box, or placeholder. If you want to treat copy as an annotation, you must be sure to insert it outside the placeholder.

This kind of subtlety does add power to the product, but it makes the learning curve steeper. Fortunately, the program will come with 55 auto-templates—basically blank presentations with color schemes and sets of masters; these can shield

novice users from the need to edit the masters. And, since the first layer of dialog boxes will contain the most commonly used line widths, fill patterns, and colors, novices may never need to use *Persuasion*'s powerful drawing tools and formatting options.

Advanced users will, of course, want to take advantage of *Persuasion*'s ability to create and edit freehand outlines. And the program's grouping, alignment, and layering functions are essential features when managing complex pictures. Ambitious artists can also maximize the color, line style, and pattern-fill palettes in order to access a wider array of choices and the program's customization options.

Persuasion's approach to color selection is three-tiered: You can work with the small palette of 16 colors, the maximized palette of 200 colors, or an editing dialog box to customize colors. However, *Persuasion* always reserves 160 colors as straight uneditable RGB values. Only the 40 remaining hues can be user-defined. Copying color schemes from one presentation to another not only replaces these 40 customized colors, but also remaps them throughout the presentation—a tricky problem if you want



Aldus's *Persuasion* is based on outlines that contain dynamic icons to format slides. Notice that the first item on this screen uses parent/child slides while the second includes a break point (the black triangle) to force text into a second column. Subsequent items display icons for bar, pie, and organization charts.

logos or other elements to remain consistent.

Persuasion's charting functions are standard business fare, but its flexibility shows in the way it lets you enhance the appearance of graphs. For example, you can subselect elements in a graph for modification without losing data links. A single, double, or triple click will select a chart, all the bars in a chart, or a single bar in a chart in turn. The only trick is to leave the previous level of selection active while you continue to click. Unfortunately, *Persuasion* doesn't support warm links directly to spreadsheet files. Though it does support DDE, it does so only in an extremely limited form that does not establish a permanent link with the external *Excel* spreadsheet.

The inclusion of *Adobe Type Manager* with *Persuasion* gives it (and all your other *Windows* applications) access to an enormous selection of high-quality fonts. Automatic speaker's notes and audience handouts make managing these details of a presentation almost transparent. Besides these, custom drivers for the *MAGICorp.* and *Autographix* service bureaus are planned to let you generate high-quality slides hassle-free.

Judging from this preview, *Persuasion* will be more than a match for most presentation graphics programs on the market. Still, the program stands or falls by its integrated outliner and the ap-

proach it demands. Only you can decide if the power its outline affords is worth the effort of committing yourself totally to its working methodology.

RENOVATING A CLASSIC

At the same time that WYSIWYG programs like *Persuasion* are stressing their textual outlining capabilities, form-driven programs like *Lotus's Freelance* are incorporating more graphical, object-oriented features. For an old *Freelance* hand, it is a weirdly wonderful experience to click on a bar chart and have the data form pop up. Yet the new *Freelance Graphics for DOS*, *Lotus's* latest version of its DOS presentation package, does just this, embedding associated data forms within the .DRW file that designates the actual slide image.

The elegance of this design means that when you edit the data form it will automatically update the existing graph. No longer do you have to go through the trouble of deleting the old graph before you image the new one. The benefits don't stop there. Now when you change output devices and switch from a film recorder to a laser printer, the chart is automatically regenerated.

Other major improvements include both *Freelance's* newfound ability to apply a common backdrop to all the slides in a presentation and on-the-fly scalable Bitstream fonts that are fully visible on screen (the latter wasn't fully implemented in our beta version). The program's new auto-charting features will allow you to generate up-to-the minute graphs from linked spreadsheets from the DOS prompt, as *Lotus Graphwriter II* does now.

FASTER CHARTS

Lotus has stretched the old familiar *Freelance* interface to the limit in this new version. The status panel appears much the same as always. But if you click on one of the attributes of a selected object—the color of text, for instance—the top-line menu changes to a mini color-selection menu. This

is a wonderful editing shortcut that allows you to change a pie chart to a bar chart, for example, with just two mouse clicks.

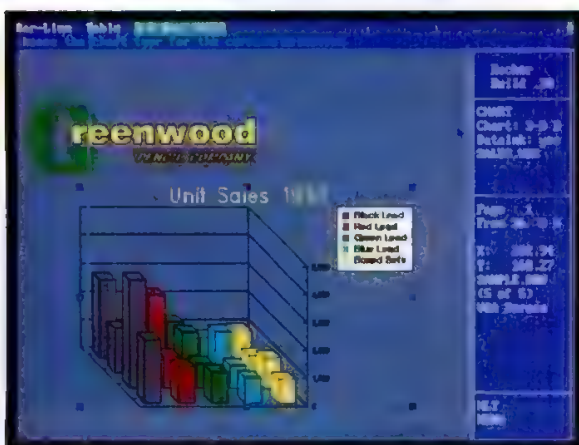
If you've ever worked with *Freelance* clip art, you'll feel right at home with the new chart gallery. Just pull a gallery file (that contains six charts) onto the spare page and use an Alt-key combination to copy the graph of your choice to the slide page. The only difference between the 50-plus charts and regular clip art is that the charts in the chart gallery have embedded, editable data forms.

Word charts are easier than ever to create, thanks to a new bundled outlining utility. This modified version of *Symantec's GrandView* contains only a subset of *GrandView's* outlining and organizational functions. But proprietary links with *Freelance* enable you to generate a whole series of slides with minimal formatting effort. The outliner is a TSR and costs some RAM, but *Freelance Graphics for DOS* can be configured to run in a smaller size, which frees up 30K of memory. And *Lotus* has finally promised to add much-needed expanded memory support, though not necessarily in the initial release.

ALMOST PERFECT

The new *Freelance* still has its limitations. You must turn the backdrops on for each slide in two modules—an awkward system. And it still falls short of full object orientation because you must split a chart into objects to directly edit elements in a graph. The program still doesn't automatically generate speaker's notes or audience handouts, and gradient fills are still available only through custom drivers for slide service output. Finally, the program still supports only 13 on-screen colors (including the background) in the active palette.

However, the new features found in *Freelance Graphics for DOS* add a lot of power and convenience without giving up the very real advantages that this market leader has long supplied. You still get a large data set, a runtime screen show, interactive manipulation of spreadsheet data, and, perhaps most important—backward compatibility with your existing library of *Freelance* presentations. For the DOS user, it's hard to do better in today's market. ■



Unlike its predecessor, *Freelance Graphics for DOS* lets you double-click on a chart to bring up an associated data form. Similarly, by clicking on the chart type displayed in the status panel at the right, you can access a mini-menu to change the graph type more easily. Though scalable fonts weren't fully implemented in this beta version, the working screen accurately displays the slate-blue background color.

GRAPHICS

PRESENTATION GRAPHICS

editing the master. *Freelance Graphics for OS/2's* slide masters go a step further, letting you attach multiple masters to a single presentation. This allows you, for instance, to have one design for horizontal-format charts and one for vertical formats. Of course, the ability to turn off the master when common sense dictates is a must.

The importance of easy editing is even greater when it comes to word charts, the most common type of chart in most presentations. Programs that offer prebuilt word chart templates and automatically format your bullet charts and outlines can save you enormous amounts of time over packages that force you to place text line by line. Some packages even have integrated spelling checkers. Though none of the products in this review have an integrated outliner like Aldus's *Persuasion* on the Macintosh and its upcoming *Windows* version, some of them can import ASCII text outlines, giving you a long start on building your presentation. All of these convenience features can make a huge difference when you're rushing to beat a deadline.

DOS VERSUS WINDOWS

Windows and *Presentation Manager* programs certainly offer the most integrated way of managing your presentations. They also stand out in other ways—for instance, when it comes to annotating and illustrating your slides. True, many DOS programs have sophisticated drawing tools, and even *Harvard Graphics* now lets you enhance charts without losing the links to your data sheet. But these functions are easier to use in programs that operate in a graphical environment such as *Windows*.

Color handling is another area where *Windows*-based programs have an edge. The more sophisticated palettes and dithering capabilities of *Windows*-based programs are invaluable when working with color visuals and clip art. A full 256-color rendition of a gradient background gives you a far better idea of what it will really look like than the dithered facsimile that 16-color programs must resort to. *Windows'* device independence ensures that most video and output devices you'd want to use are likely to be supported, and its memory management capability gives programs more breathing room for advanced functions.

But the most important benefit of object-oriented environments like *Windows* and *Presentation Manager* is in making

packages easier to use. A visual slide sorter that shows all of your slides in tiny thumbnails is much easier to reorganize than a text table: When you click and drag a thumbnail to a new location, it remains linked to the actual slide in your presentation. Similarly, double-clicking on a slide element and changing its attributes or underlying data in a dialog box is much

We found *Windows*-based programs to have a clear superiority in presentations.

easier than picking your way through a forest of menus. Though other programs running in their own graphics environment (like *Presentation Team*, which relies on the *GEM* interface) offer some of these benefits, the advanced functions of *Windows* give products that run under it an edge in overall power.

Don't assume, though, that old-style graphics programs are washed up. Anyone who has ever created—and then changed—a complex PC-based screen show, for instance, would vote easily for *Freelance's* self-explanatory tabular script approach, which organizes timing and transitions much more easily than fancy slide sorters or nested dialog boxes. Similarly, for editing basic word charts, you may prefer the character-based table approach taken by such venerable classics as *Harvard Graphics* to the WYSIWYG text editing (and slow screen redraws) offered by graphical competitors. And of course, the advantages of *Windows* programs may mean nothing if you don't have a hardware budget to support them. In such cases, it's worth looking for a suitable DOS alternative.

PICTURING YOUR DATA

Despite the desirability of Macintosh-like WYSIWYG features for creating entire presentations, many business users need more than pretty pictures. They need

powerful charting tools that leverage the data accumulated in DOS spreadsheets and databases to help them generate information-laden charts for publications and presentations.

Windows programs have a clear superiority in presentations, but *Windows* and DOS programs vary in the strength of their data-charting functions. Under *Windows*, for instance, Micrografx's *Charisma* far outstrips *Microsoft PowerPoint* in the breadth and strength of its charting functions. Among DOS programs, *Freelance Plus* stands out for its exceptionally tight links to Lotus worksheets, which let you update your charts automatically simply by updating the source data. *Applause II*, *DrawPerfect*, and *Harvard Graphics* are also very suitable for creating ordinary business charts.

The wonders of DDE technology, however, may be making the charting component of your graphics module less important than it was. *PowerPoint's* lack of all but the most basic charting functions, for instance, is a deliberate omission. For serious charting, you're expected to turn to *Excel 3.0's* sophisticated new graphics functions instead. Microsoft's object linking and embedding (OLE) specification makes this practical by letting you incorporate *Excel* charts as live objects into your *PowerPoint* presentations, just as if they were generated in *PowerPoint's* own charting engine. Simply double-click on an embedded chart, and *Excel's* charting module opens up, ready for action. This sibling relationship is mirrored by the links between *1-2-3/G* and *Freelance Graphics for OS/2* in the OS/2 environment.

One thing none of these products do well is technical charts. Though some (notably *Charisma* and *ImageStation*) can handle the millions of data points that technical plots require, they don't offer enough in the way of mathematical plotting and transformation options for the most demanding technical users. If you regularly produce such charts, you'd be best off generating them in a package designed specifically for that purpose (see "Picturing Your Numbers: 12 Technical Graphics Packages," *PC Magazine*, March 26, 1991) and then incorporating the results into your presentations as imported drawings.

SUCCESS WITH SLIDES

The ultimate purpose of presentation graphics is to generate a presentation, and

...Like South Dakota, Where Saved \$10,747,

"We asked an independent research firm to do a study for us," said Ted Waitt, Gateway 2000 President. "I wanted to see an unbiased, direct comparison of features and prices from the manufacturers who advertise in the Computer Shopper. The results were astonishing," he exclaimed, "even to me. Ranked by best price, Gateway 2000 was the only major direct marketer at the top of the lists. The other 'big guys' in the direct market field were so far down in the rankings I couldn't even find some of them. Get a copy of the study and see for yourself."*



"This study proves what we've been saying all along. Gateway 2000 clearly offers the best value in the computer industry." Ted Waitt, Gateway 2000 President

Computer buyers who purchased Gateway 2000 systems in January saved an average of \$697 per system. This figure comes from a comparison of 132 computer manufacturers' advertised prices in the January 1991 issue of Computer Shopper – the nation's most comprehensive source of direct market computer products.

That means Gateway customers shared a total savings of \$10,747,179 on 15,427 systems in one month alone. Call for your free copy of the study, which includes details of how the information was prepared, and compare for yourself. This kind of value is worth investigating.



That's The Best

"Whenever I'm asked," continued Ted Wain, "why Gateway 2000 is so successful, my answer is: value. When you buy a Gateway 2000 computer, you're getting the best price, best quality and features, best service, all from a very strong, healthy company. That's value."

"Then I'm asked how we provide value," Ted remarked, "and the answer is almost the same. It's values. The values of the people at Gateway 2000 give our product its value," he said.

"People who grow up in the Midwest are inevitably shaped by the values of a culture that is one way or another dependent on the earth," he explained. "And when you depend on the earth for your living, you learn to value frugality, quality, resourcefulness, hard work, strength, and most of all, integrity and honesty in all of your dealings with other people. Providing value in our products starts with these values."



Earle Grueskin, Facilities Manager: "Our plant is a functional, no-frills, 70,000 square-foot metal building with a gravel parking lot. Someday we might pave the parking lot. Then again, we're getting along OK with the gravel."

We Value Frugality

Being frugal is the opposite of being wasteful. At Gateway 2000, the company doesn't waste time or money. For example, when a new plant was constructed in 1989, the company didn't waste money on showy, chrome-and-glass corporate offices. The new facility houses an efficient factory and functional offices. Although the company that sells more systems through the direct market channel than any other PC manufacturer in the nation can certainly afford luxurious offices, that wouldn't be frugal – and to provide the best value in the industry, Gateway 2000 must be frugal.



Barry Beldin, Production Manager: "We test each computer before it goes to shipping. Quality is our top priority."

Ken Gardner, Assistant Manager: "When I'm building a computer, I'm going to picture what the customer is going to see when they get it."



Value In The Industry – And It All



We Value Quality

Being frugal doesn't mean skimping on quality. Only the highest quality components from the most quality-conscious suppliers go into a Gateway 2000 computer. Midwestern pride in workmanship and quality is demonstrated by every one of nearly 100 skilled assembly technicians. These technicians build your complete system one at a time.

"Total Quality Management" is Gateway's commitment to quality. TQM is a progressive quality philosophy developed by W. Edwards Demming, a native of Sioux City, Iowa. TQM is widely used to increase quality and productivity. Its use throughout Gateway 2000 has allowed the company to continually improve operations – even while the firm is growing at a phenomenal rate. To provide the best value in the industry, Gateway 2000 must value quality.



Product Testing: "I test every computer before it goes out. If anything looks questionable, we fix it immediately."

Assembly Technician: "I try to make every computer a computer. I try to make every machine is an building it for."



Jerry Mayer, Vice President, Operations: "TQM consists of continuous process improvement activities involving everyone in the company, managers and workers, to improve value and customer satisfaction at every level."

We Value Strength

A company's strength is measured by its balance sheet. As independent sources will confirm, Gateway 2000 has an enviable balance sheet coupled with strong growth. Inc. Magazine listed Gateway as the second fastest-growing private company in America during 1990. Financial strength is crucial to you. What good are warranties, guarantees or promises of lifetime technical support if the company that sold you the computer goes out of business? To provide the best value in the industry, Gateway 2000 must be strong.



Although Otis, Rock, Luther and Chili Dog are evidence that Gateway has plenty of brute strength, the company's real strength is in a robust balance sheet and healthy growth. Otis is our nickname for John Staley; Rock is Mike Hingst; Luther is Brent Culbertson; and Chili Dog is Brent VanderWeil.

You Find The Best Values In The Most Unusual Places...

North Sioux City, South Dakota, for example. This little town probably doesn't come to mind when you think of shopping for a personal computer. And yet the best values in the PC industry come from North Sioux City, home of Gateway 2000.

Gateway 2000 has roots firmly planted in this part of the country. When buffalo still roamed the great plains, George Waitt founded the Waitt family cattle business in the frontier town of Sioux City, Iowa. Family legend says he started his herd by saving cattle that jumped off barges into the Missouri River.

Over a century later, George's great, great grandson, Ted Waitt, founded Gateway 2000 in the same tradition. Gateway was started by rescuing PC users who were stranded in a marketplace without a source of quality, affordable computers.

Today, Gateway 2000 continues the tradition of providing the best value in the industry, based on old-fashioned Midwestern values.

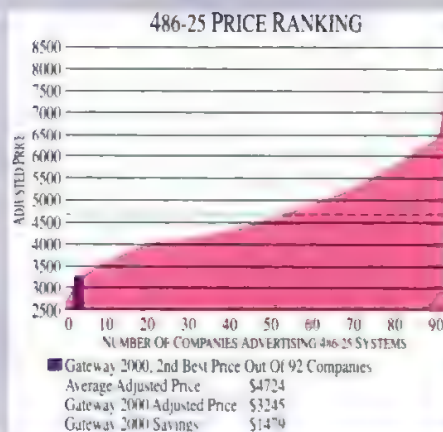


Gateway 2000 Customers 179 In One Month.



The Badlands of South Dakota are a moonscape on earth.

Prices in the 386SX-16 study were adjusted to reflect a system configuration including 4 MB RAM, 1.2 MB 5.25" Disk Drive, 1.44 MB 3.5" Disk Drive, 40 MB Hard Drive, 16 Bit VGA with 512K, Color SVGA Monitor, Keyboard, DOS, 1-year warranty and 30-day guarantee.



Prices in the 486-25 study were adjusted to reflect a system configuration including 64K Cache RAM, 8 MB RAM, 1.2 MB 5.25" Disk Drive, 1.44 MB 3.5" Disk Drive, 100 MB Hard Drive, 16 Bit VGA with 512K, Color SVGA Monitor, Keyboard, DOS, 1-year warranty and 30-day guarantee.

**Call 800-523-2000 and talk to a sales representative for further information about this study.*

Gateway 2000 Systems

12MHz 286VGA

- 80286-12 Processor
- 1 MB RAM
- 1.2 MB 5.25" Drive
- 1.44 MB 3.5" Drive
- 40 MB 17ms IDE Drive with 32K Cache
- 16 Bit VGA with 512K
- 14" Gateway Crystal Scan 1024 Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 101 Key Keyboard
- MS DOS 3.3 or 4.01

\$1495.00



GATEWAY 386SX

- 4 MB RAM
- 1.2 MB 5.25" Drive
- 1.44 MB 3.5" Drive
- 40 MB 17ms IDE Drive with 32K Cache
- 16 Bit VGA with 512K
- 14" Gateway Crystal Scan 1024 Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 101 Key Keyboard
- MS DOS 3.3 or 4.01
- MS WINDOWS 3.0

\$1895.00



25MHz 386 VGA

- 4 MB RAM
- 1.2 MB 5.25" Drive
- 1.44 MB 3.5" Drive
- 80 MB 17ms IDE Drive with 32K Cache
- 16 Bit VGA with 1 MB
- 14" Gateway Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 101 Key Keyboard
- MS DOS 3.3 or 4.01
- MS WINDOWS 3.0

\$2395.00

25MHz 386CACHE

- 64K Cache RAM
- 4 MB RAM
- 1.2 MB 5.25" Drive
- 1.44 MB 3.5" Drive
- 80 MB 17ms IDE Drive with 32K Cache
- 16 Bit VGA with 1 MB
- 14" Gateway Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 101 Key Keyboard
- MS DOS 3.3 or 4.01
- MS WINDOWS 3.0

\$2695.00



33MHz 386VGA

- 64K Cache RAM
- 4 MB RAM
- 1.2 MB 5.25" Drive
- 1.44 MB 3.5" Drive
- 200 MB 15ms IDE Drive with 64K Multi-Segmented Cache
- 16 Bit VGA with 1 MB
- 14" Gateway Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 101 Key Keyboard
- MS DOS 3.3 or 4.01
- MS WINDOWS 3.0

\$3195.00



25MHz 486 VGA

- 64K Cache RAM
- 8 MB RAM
- 1.2 MB 5.25" Drive
- 1.44 MB 3.5" Drive
- 200 MB 15ms IDE Drive with 64K Multi-Segmented Cache
- 16 Bit VGA with 1 MB
- 14" Gateway Crystal Scan 1024NI Color VGA Monitor
- 1 Parallel/2 Serial Ports
- 101 Key Keyboard
- MS DOS 3.3 or 4.01
- MS WINDOWS 3.0

\$3995.00

33MHz 486VGA

- Same configuration as the 25 MHz 486.

\$4395.00

BEST BUY

- Same features as our 33 MHz 386 VGA system except this machine has an 80 MB 17ms IDE Drive instead of the 200 MB 15ms IDE Drive.

\$2795.00

STANDARD FEATURES & SERVICES

- Microsoft® WINDOWS™ and Mouse with all 386 and 486 systems
- 30-day money-back guarantee
- One-year warranty on parts and labor
- Leasing options now available
- Toll-free technical support for the life of the machine
- Free on-site service to most locations in the nation
- Replacement parts sent via overnight shipping free of charge
- Free bulletin board technical support
- New sales hours: 7am-10pm CST M-F 9am-4pm CST Saturdays

NEW CRYSTAL SCAN 1024NI

- Our new 14" Gateway Crystal Scan 1024NI color VGA monitor comes standard with all 386 DX and 486 systems. This monitor

is non-interlaced for a flawless, flicker-free display. 1024 x 768 @ 60 Hz. 800 x 600 @ 72 Hz. 28 D.P.

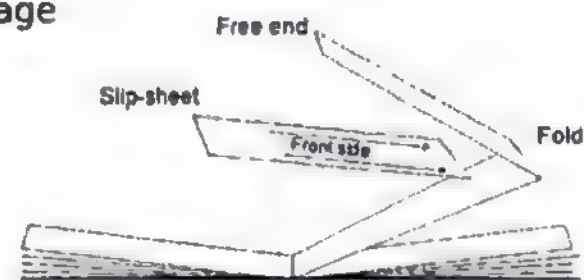
We custom-build each Gateway 2000 computer to customer specifications. We'll gladly provide you with a quote on your configuration. 386 and 486 are trademarks of Intel Corporation. Due to the volatility of the DRAM market, all prices are subject to change. Prices do not include shipping.



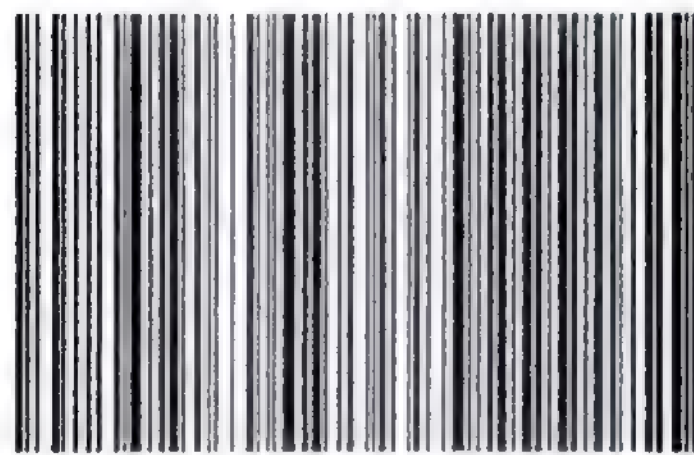
8 0 0 - 5 2 3 - 2 0 0 0

610 Gateway Drive • N. Sioux City, SD 57049 • 605-232-2000 • Fax 605-232-2023

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



Inverted Foldout slip-sheet

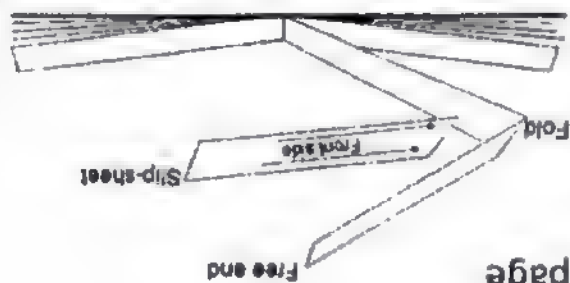
Folded edge of the page

1. Open the foldout page
2. Insert this sheet with

1. Front side touching the free page
2. Arrow pointing to the fold

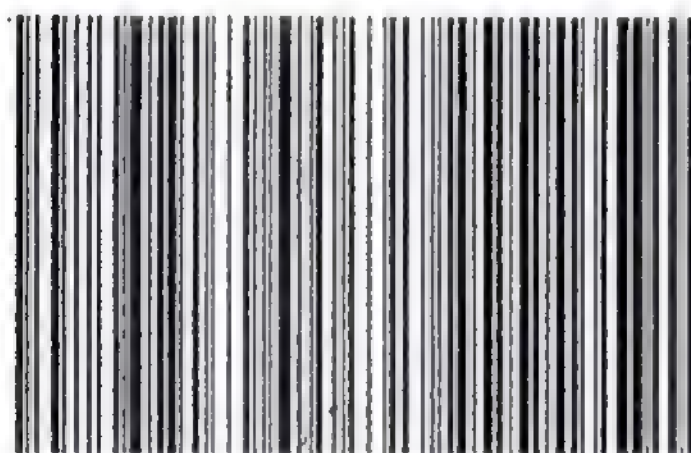
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs511pBack-0018

Back

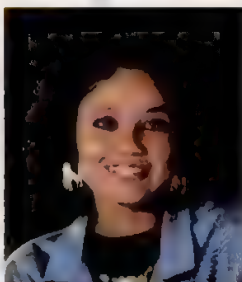
1. Follow instructions on the other side

Starts With Values.



Kevin Costner photographed this same South Dakota buffalo herd for his movie, "Dances With Wolves."

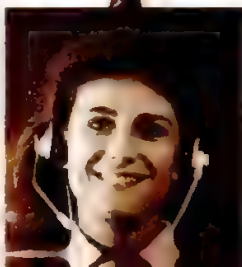
Adrienne Garrigan,
Customer Service:
"My job is to keep my
customers informed. I
really push to make
sure we live up to our
commitments."



Wade Ridenour,
Sales: "I stress
listening. If you listen
to the customer, and
answer questions
honestly and
knowledgeably, the sale
will happen without
any high pressure
tactics or hype."



**Tracy Ping, Technical
Support:** "I think our
philosophy is unique in
the industry because no
matter what the
problem is, we do our
best to help our
customers."



We Value Integrity

Integrity is the fundamental value without which any organization is doomed. At Gateway 2000, you'll find integrity throughout the company, most visibly in sales and customer support. Gateway salespeople honestly represent the company and its products. Each person you deal with in customer support, during and after the sale, has a personal commitment to make sure you're completely satisfied. To provide the best value in the industry, Gateway 2000 must have integrity.

We Value You

Gateway customer Robert C. True, Jr., writes: "We on the East Coast have become so accustomed to surly, uninformed and disinterested...staff, that working with your group may have induced an element of 'Culture Shock.' Every person in your organization operates as if there is only one customer in the world - the one they are talking to at the moment."

"You've got a friend in the business" is more than a slogan. It's our way of life here at Gateway.

Gateway 2000 Assurances

Like most companies, Gateway 2000 offers a good written guarantee and warranty on all products. Unlike most companies, we treat each customer as an individual, taking special care to see that your individual situation is handled fairly. Your satisfaction is our number one priority.

30-Day Money-Back Guarantee

If you're unhappy with your Gateway 2000 purchase, for any reason, you can return the system within 30 days for a full refund.

One-Year Warranty

Every Gateway 2000 system comes with a one-year warranty on parts and service. If a part needs to be replaced, we'll quickly send a replacement part via overnight shipping free of charge. Beyond the warranty, we provide free telephone technical support for the life of your machine.

Free On-Site Service

If unusual difficulties occur, we can provide free on-site service to most locations in the country.

Credit Terms

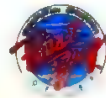
You can purchase your Gateway 2000 system on C.O.D. terms or with American Express, Discover, Visa, or Mastercard. Net 30-day credit terms and leasing options are also available to qualified buyers.

New FCC and Product Development Labs

As an added assurance to you that your Gateway 2000 system will comply with all FCC certification requirements, we've just installed a new FCC testing lab in our recently expanded 70,000 square-foot manufacturing facility. We've also expanded our product development lab in which we are continually testing new components. The quest for even better price/performance computer systems never ends at Gateway.

New Sales Hours

For your convenience, we've expanded our sales hours. New sales hours are from 7 a.m. to 10 p.m. (CST) Monday through Friday and 9 a.m. to 4 p.m. Saturdays.



"You've got a friend in the business."

8 0 0 - 5 2 3 - 2 0 0 0

610 Gateway Drive • N. Sioux City, SD 57049 • 605-233-2000 • Fax 605-233-2023

modern presentation programs have made great strides in the direction of easier slide output. More and more often, what you see on your working screen closely represents the final output. And graphics software developers have started to establish close ties with national slide service bureaus to make it easy for you to render your presentations on a variety of media—from high-quality color 35-mm. slides to transparencies and color prints—without leaving your desk. Using built-in telecommunications utilities supplied with most programs, you can transmit your presentations to a service bureau by modem at any time of the day or night and expect to receive slides just a few days later.

Though generating color slides is by no means effortless (a host of problems inevitably arise from the need to represent the hardware colors of a film recorder with the limited number of colors on a PC screen), such devices as 256-color screen displays and custom film-recorder drivers help ensure the closest possible match between previews and final film.

Custom slide-service drivers let you use eye-catching custom backgrounds, and the smartest of all can generate exceptions reports alerting you to potential problems. But the biggest benefit you get is the expertise that service bureaus are developing with product-specific file formats. In our tests, several problem slides were fixed and regenerated by the service bureau before we ever saw them because the operators have a heightened awareness of software-generated glitches.

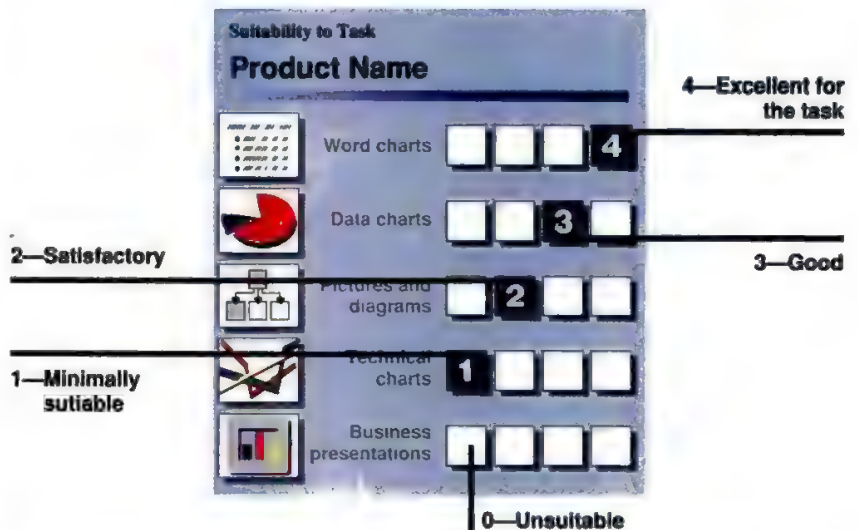
THE PROOF IS IN THE PROOFING

Unfortunately, other forms of output haven't kept pace with the improvements in slides. When you print a color presentation on a black-and-white laser printer, for example, you may find it hard to get a readable printout. Distinct colors often get mapped to murky gray scales, and though some programs can map colors to fill patterns or invert gray scales for greater legibility, these options can give uneven results. Only with programs like *PowerPoint* and *Freelance Graphics for OS/2*, whose master schemes let you apply new palettes globally, is black-and-white printing completely reliable without copying and recoloring the entire presentation slide by slide.

Device-dependent scalable fonts also trip up some programs. Most packages support PostScript fonts, but those won-

PRESENTATION GRAPHICS: SUITABILITY TO TASK

While the reviews and Editors' Choice sidebar will give you a good idea of how these products stack up overall as presentation tools, the individual capabilities of the packages are not equal. Use these ratings, together with the features table and the product reviews, to help you match a package to the tasks you perform most often.



Word charts evaluates the ease with which you can create word charts, the most common type of chart used in presentations. A satisfactory score reflects the ability to create word charts easily, either by filling in tables or by placing word-wrapped text directly on the graphic. Extra points are given for more-elaborate multiline templates that allow automatic creation of bullet charts, outlines, and multicolumn tables. Support for high-quality scalable typefaces is another plus.

Data charts evaluates the program's ability to create basic business charts (bar, pie, line, scatter, and area) and customize them. We also considered the quality of the facilities for importing and manipulating data (including the ability to maintain live data links), the intelligence of label and legend handling, the ease of selecting fill patterns and colors, and the aesthetic quality of the charts.

Pictures and diagrams To be useful for creating diagrams, annotating charts, and embellishing presentations with clip art, a program must come equipped with a range of basic drawing tools for drawing boxes, lines, circles, and arrows. It should also be able to size and place vector images on your slides. More useful are products that can group and ungroup objects, cut and paste, and duplicate or flip them; most useful of all are the ones

that can edit the nodes of Bezier curves. Color handling, the ability to import a range of vector and bitmap file formats, and the range and quality of the package's clip art collection are also important.

Technical charts None of these business graphics packages offers the capabilities of a specialized technical charting package, but nearly all make some concessions to the needs of technical users. A package earns a minimal score for basic technical graphs if it produces line and scatter charts with logarithmic scaling. Extra points are given for the ability to handle over 10,000 data points, as well as for multiple axes, error bars, curve fitting, and other advanced technical charting features.

Business presentations assesses the product's suitability for creating presentations. Considerations include how easily you can manipulate and print entire presentations, how quickly you can create presentations from outlines, and how flexible you find the background and gradient fill support. Other factors are screen-show capabilities and how easily you can produce 35-mm. slides. The best packages offer an array of global style and color options through intelligent slide masters; they can also generate speakers' notes and handouts automatically.

derful PostScript typefaces can disappear when you print on an HP LaserJet unless you've taken the trouble to generate, store, and download every size and style of every font you use.

Screen-show facilities, which help you practice your presentations and even present them to audiences using your PC,

are also plagued by a number of problems. None of the *Windows*-based programs, for example, offer a run-time utility that lets you take your screen show to any PC without lugging along the entire



EDITORS' CHOICE

• Microsoft PowerPoint

In the past, PC-based business graphics software was more of a collection of tools than an application. Data charting, word charting, and annotation functions were relegated to separate menus and even separate modules. But today, as power spreadsheets take over many of the functions of traditional charting packages, and as *Windows* makes it easier to mix and match exactly the right graphics tools, business graphics programs are shifting their focus. They are now most important as coordinators for arranging these disparate elements into consistent presentations.

If presentation processing is the wave of the future, no package can hold a candle to *Microsoft PowerPoint* (\$495), our Editors' Choice. Breaking decisively with the modular, table-driven past, *PowerPoint* uses *Windows* 3.0's graphical interface to excellent advantage. Its integrated, visual environment for sequencing slides makes it easy to find the slides you want, rearrange them, or borrow them from other presentations. And its object-oriented interface lets you easily modify slide elements directly, simply by pointing and clicking.

PowerPoint isn't the first or the only program with this kind of integration, but a myriad of timesavers is what gives it its decisive edge. Its master slides, word-chart styles, and global color schemes—neither too basic nor too complex—help ordinary business users put together sharp-looking presentations rapidly. And Microsoft has come up with the best solution yet to the problem of creating slide output: Its custom service link with Genigraphics, which encompasses carefully matched color palettes, professionally selected clip art, and trouble-free communications as well as slide imaging services, makes this process about as painless as it can possibly be.

THE BEST FOR CHARTING

That said, it's important to point out that *PowerPoint*'s built-in charting and drawing tools are minimal. This is a deliberate decision: For all but the most basic business charts, Microsoft expects you to use *Excel* 3.0, whose superlative charts can be incorporated seamlessly into your presentations through Microsoft's innovative object embedding and linking technology. Passing a live chart object rather than data between spreadsheet and graphics package has important advantages: It saves you a data import step, and a spreadsheet is a far better place to manipulate your data than a graphics program. But that's no help at all if what you need is a program to make fancy charts.

In this case, you might want to pick *Charisma*. Though this \$495 package is complex and sometimes awkward to use, the power and versatility of its charting functions are unsurpassed. Its also one of the few packages that let you edit drawings containing Bezier curves, making it a natural if you need to produce complex charts and diagrams for desktop-published documents. On the DOS side, *Freelance Plus* is also strong in the data-charting department. It has a particular flair for repetitive charting, where its strong data-linking capabilities with *Lotus 1-2-3* worksheets give it an edge.

WHERE IT'S GOING

Microsoft won't be alone in the field much longer. Expect additional announcements of powerful new *Windows* presentation programs in the coming months, both from major players like Aldus and Software Publishing, and brash unknowns. Of these, the long-awaited *Windows* version of Aldus's *Persuasion* may be the most interesting—and controversial. *Persuasion*'s powerful integrated outliner, flexible templates,

and advanced word-charting features may or may not strike you as the most significant innovation in presentations since the invention of the slide projector. But the power and richness of *Persuasion*'s comprehensive capabilities make it a mark for every competitor to shoot for.

You can get an idea of what to expect from Lotus's *Windows* product by looking at *Freelance Graphics for OS/2*. The multitemplate slide masters of this rich and complex package are even more flexible and powerful than *PowerPoint*'s (though they're also more complicated to use). And unlike Microsoft, Lotus doesn't make you pay extra for a robust charting engine. Unfortunately, the huge memory appetite, sluggish performance, and shortage of drivers of the OS/2 version (a real drawback of using OS/2 today) make it impossible to recommend for most users. But its fine qualities deserve a more-than-honorable mention, and, judging by this preview, the upcoming *Freelance Graphics for Windows* should really be something worth having.

So where does this leave diehard DOS users who can't or don't want to move to *Windows*? Well, if your money is burning a hole in your pocket right now, *Applause II* and *DrawPerfect* are solid, all-around performers. *Harvard Graphics*, though now very dated in its design, is still a reasonable choice for simple business charts and presentations. But if you can, you'd do well to wait for Lotus's revamped *Freelance Graphics for DOS*, which should be shipping soon after you read this. Judging from our advance look, this innovative package is not only more powerful than its predecessor at data charting but, with its pop-up outliner, on-screen font support, and point-and-click manipulation of elements, it's a fully competitive presentation tool as well.

presentation program. Of the selection, *Harvard Graphics* goes farthest with its HyperShow utility, a presentation tool that lets you build interactive presentations that you can move through by clicking on hot buttons that link individual slides. But true navigation requires a robust script language, including logical if/then statements, branching, user input variables, and the ability to handle subroutines or to shell out to DOS programs. If you're serious about PC-based presentation, you'd be better off trying a program dedicated to the job (see the sidebar "Beyond the Screen Show: PC-Based Presentation Packages").

UNATTAINABLE PERFECTION

Presentation graphics packages do a variety of things. Much as we hate to admit it, there is no one product that does everything well. New products that promise better functions and easier editing are in the wings (for a peek at what to expect, see the sidebar "Preview of Coming Attractions"). In the meantime, concentrate on the features that address your current needs. If you've a lot of word charts to produce, get the best font technology and the most comprehensive word chart formatting you can find. If your presentations are heavily based on charts and graphs, be sure to pick a package with robust data charting and live links to underlying data. Know your interests, and you should be able to find a package to serve them.

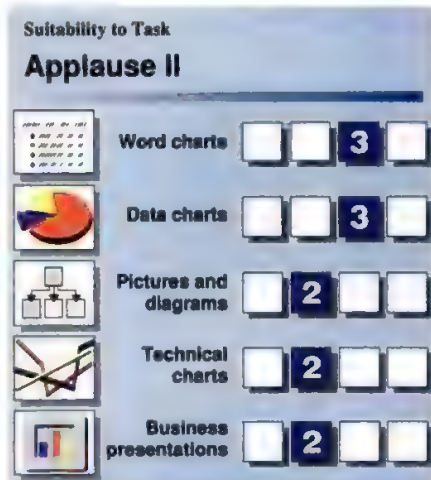
Applause II

by Ronni Geist and Harry Geist

Applause II (\$495) from Ashton-Tate offers a winning combination of power and style. If you want to create snazzy business charts with impressive 3-D effects, quality typefaces, and a rainbow of colors on a DOS machine, it's well worth your consideration.

It is easy to harness the capabilities of this powerful package. Its DOS-based graphical interface uses pull-down menus, toolboxes, and selection buttons to good effect. The program's three-window design divides your tasks logically, making it easy to learn: You enter data and define graph elements in the Chart window, annotate and edit your charts in the Draw window, then finally put your slide shows together in the Present window.

The program makes unusual use of the mouse. The right mouse button, too often ignored in other programs, here summons up options for the item being clicked on. And pressing both buttons (or the middle button on a three-button mouse) immedi-



ately redraws the screen. A word of caution: When responding to a yes/no question, the left button always means "yes" and the right button always means "no." If you instinctively point to "no" and click on the left button, *Applause II* ignores the letter and instead interprets the left click as a "yes" answer.

DAZZLING 3-D

Applause II produces impressive charts, especially those with 3-D effects. You can display a chart from any of eight different vantage points by clicking on a menu item. Five thousand dithered colors are available on screen, and you can use a full spectrum of 16.7 million colors for 35-mm. slides, resulting in fine, three-dimensional shaded effects for bar, pie, and area charts, as well as smoothly graduated fills. The software comes with 11 predefined 256-color palettes. You can tailor these by substituting individual colors of your liking or by mixing custom colors to create palettes of your own.

Getting to the end result isn't as easy as it could be. You can link charts directly to imported spreadsheet data, but this connection is at best lukewarm. If data is changed in an external file, you must reimport it to change the chart, although you do not have to respecify ranges. Once you copy a chart into the Draw window for annotation, the link is broken.

Chart options don't always work

smoothly, either. For instance, if you place the legend for a bar chart in a customized location and then resize the chart, the legend does not move automatically with the chart. Pie charts cannot have separate legends: Labels can only appear near the slices and are truncated at a maximum of 12 characters.

There's a full array of drawing tools, easily accessible from an on-screen toolbox, but there is no specific function for creating drop-shadowed rectangles. To create a box with a shadowed effect, you must superimpose one rectangle on the other.

One unique feature is the Distribute function, which you can use to produce special graphics effects. This function builds a succession of images between two shapes that have been created with the same drawing tool, much the way the tweening function of an animation program works.

FINE FONTS

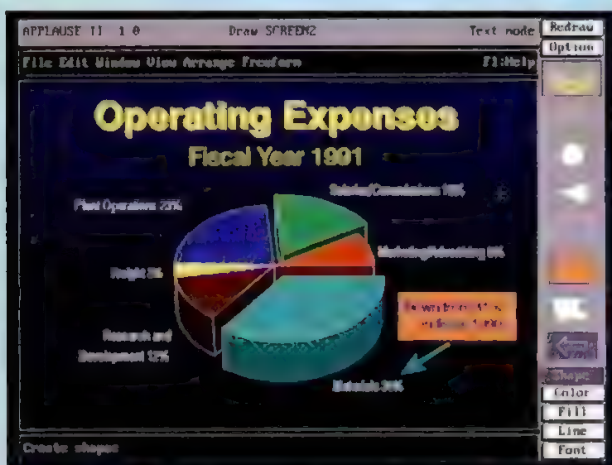
Applause II uses Bitstream fonts; it includes Dutch and Swiss typefaces in a variety of styles. The results are of high quality, even if text is rotated or resized. Unfortunately *Applause II*'s method for sizing fonts is eccentric. Instead of using standard point sizes, you designate the font size as a percentage of the screen size. Thus, choosing "10" does not mean a 10-point font; instead it means that the font's size will be 10 percent of the work area.

You cannot import ASCII text files, though the program is reasonably adept at creating word charts. It has 16 templates for building free-form, bullet, and columnar charts, and you can save your own designs as user-definable templates. In the predefined templates, the size of the

FACT FILE

Applause II, Version 1.0
Ashton-Tate,
20101 Hamilton Ave., Torrance, CA 90502-1341;
800-437-4329, 213-329-8000.
List Price: \$495
Requires: 512K RAM, hard disk, graphics adapter, DOS 3.1 or later. Mouse recommended.
In Short: A solid program with good charting, reasonable presentation management, and a few quirks, *Applause II* makes a good all-around choice for diehard DOS users.

CIRCLE 401 ON READER SERVICE CARD



Applause II's Draw window lets you create free-form graphics and embellish charts created in the Chart window.

font and the number of lines per chart is fixed, which prevents you from putting too much information on a chart. Word wrapping occurs as text is entered, but this option can be disabled. Attributes can be changed either as the text is being entered or afterwards.

SPRUCING UP CHARTS

Applause II can import clip art in several formats, but in testing it proved to have some problems opening CGM files. Since the software substitutes fill patterns for solid colors, the CGM image is not nearly as vibrant or as true-to-color as those we have seen in other packages. We encountered no unexpected results importing bitmapped graphics stored in .GIF or .PCX formats, however.

Applause II can position up to four charts on a single page, which can be especially useful for creating handouts. The program supports a variety of output devices, including printers, plotters, and film recorders. On the Laserjet III, however, the translation of colors to patterns was ineffective because many colors were mapped into very dark—nearly indistinguishable—fill patterns.

Applause II's screen-show capabilities are basic. In the Present window, you select the files that will comprise the screen show, indicate whether the change from one slide to the next should occur after a specific amount of time (automatically) or after a key press (manually), and specify the transition effects you would like. However, many of these effects are inordinately slow. No runtime module comes with the package, either.

Applause II includes a well-integrated, easy to use communications module for sending a presentation to the Ashton-Tate Graphics Service, which will produce 35-mm. slides, transparencies, or prints from your files.

By the time you read this, Version 1.5, a major upgrade, should be available. This release will have many new features, including full support for local area networks, a built-in spell-checker, a runtime slide show function, new clip-art images, background designs, sample charts, and transition effects, as well as some repairs to the product's file-import functions.

Applause II produces some of the nicest 3-D charts on the market, and its graphical user interface is easy to use. With the inclusion of a runtime module and other new features in Version 1.5, it should be an even better value for the DOS user.

CA-Cricket Presents

by Luisa Simone

CA-Cricket Presents first migrated from the Macintosh to the PC platform over two years ago. In that time, it has acquired a prefix to its name, a new version number, a few new enhancements, and a low, low list price of just \$199. But in most other ways, this program remains—sadly—the same.

Don't misunderstand. Version 1.3's replacement of Bitstream's device-dependent raster fonts with Nimbus Q's device-independent vector fonts deserves applause. The 12 typefaces now bundled

with the package mimic the fonts in a standard PostScript printer. A WYSIWYG text-editing box lets you interactively set indents, tabs, and margins on a pop-up ruler. Different settings can be applied to each line of copy, so you can align tabbed paragraphs easily by moving the indent marker.

WORDS IN THE ABSTRACT

If you work with lots of word charts, you'll benefit from *Cricket's* bundled—but separate—outliner, CA-Abstract. This bare-bones program lets you assign indent levels to unformatted ASCII text. You can also perform clipboard operations either on single lines of copy or on an outline topic and all of its dependent items. You can use Abstract files in conjunction with the Windows clipboard and *Cricket's* Auto Presents feature to generate multiple slides automatically.

Unfortunately, you'll find it almost impossible to retain complex formatting if you ever need to edit the text. To duplicate heavily designed text blocks, which should be a simple copy-and-paste operation, it's easiest to either rekey and reformat from scratch or else to keep each text element in a separate editing box. The latter approach worked well on the double-column word chart in our test presentation: The various text boxes proved easy to align, and the bullets, which are handled as part of paragraph formatting, worked flawlessly.

Cricket does use a background that can be applied to all the slides in your presentation. But since *Cricket* assumes that you will use backgrounds for only the most basic of elements, like gradient fills and automatic footers, you can never turn it off. Other formats can be applied to the foreground via templates; in all fairness, these are easy to create and even easier to apply. You can even use multiple templates per frame to create complex images. However, there are built-in limitations. For example, in a graph template, you can modify the internal data sheet only by manually reentering the data or by pasting information from the clipboard. There is no way to use graph templates in conjunction with disk-based worksheet files.

LESS THAN IMPRESSIVE IMPORTS

If you forego the use of templates, you can access external worksheets via the Import option on the File menu. But cleaning up a spreadsheet is impossible within *Cricket*:



The easiest way to get from here,



to here.



slides and handouts.

We designed PowerPoint software especially for business people like you who

want a program that's easy to learn and use.

And if you're a Harvard Graphics® user, PowerPoint now includes a translator for Harvard Graphics files.

Just call (800) 541-1261, Department R09, for the name of your nearest Microsoft reseller.

Microsoft
Making it all make sense

Recycle

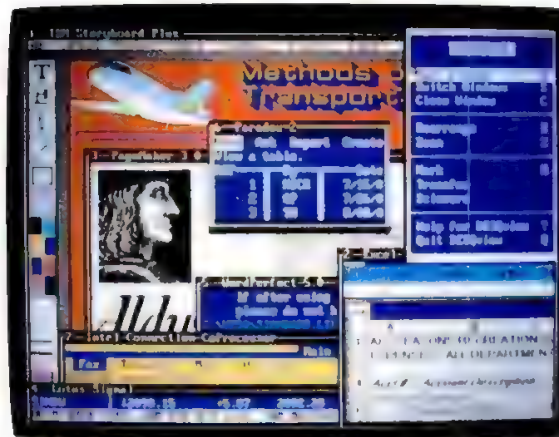
Everyone wants more productivity out of their computers.

But not everybody is willing to spend a fortune to get it. That's why Quarterdeck productivity software is outselling everyone else's—including Microsoft's.

DESQview Multitasks and Windows on Your PC

As early as 1982, computer enthusiasts found our products helped them set up their ideal working environment. Since then, step-by-step, we've improved DESQview into what some very knowledgeable people call "the best alternative to OS/2".

Today's DESQview allows you to multitask multiple programs in windows side by side—text programs; graphic programs. But best of all, you don't have to buy a lot of new hardware and software to use it. DESQview works with the PC and the programs you now own.



Over 1,000,000 users multitask their programs with DESQview.

QEMM Breaks the 640K Barrier

Break the 640K barrier in DOS—or in Windows 3.0—and give your DOS programs up to 130K more room within the first megabyte of memory, plus another 96K of video memory, in some instances.

QEMM takes buffers, network drivers, TSRs and other memory-using utilities and moves them into idle areas between 640K and one megabyte.

It's not complicated. It's easy. Just type *Optimize* and QEMM does the rest.



software package in the PC industry in April, May and June 1990.

QEMM 386 is included with DESQview 386 to create the optimum operating environment for productivity oriented users of 386, 386SX and i486 PCs.



Number one.

QEMM 50/60 is designed to work in IBM® PS/2™ Model 50 and 60 PCs with specific IBM adapter boards.

QEMM is the #1 selling utility according to distribution sources. In fact, it was the number one selling



These are some of DESQview's most recent awards



These are some of QEMM's most recent awards

your PC

Manifest Gives You In-Depth Knowledge of Your PC



Our newest utility is Quarterdeck Manifest, the best way to discover everything you ever wanted to know about your PC. Manifest shows you around 'under the hood', pointing out how memory is used, comparing memory speeds, and indicating how you can gain more room for your programs to work.

It can point you to as much as 130K of additional RAM your programs can use. It shows you which memory areas are faster. It even helps you compare add-in memory board performance.

Manifest does for memory what PC Tools Deluxe does for disks. And it's easy to use.



Manifest has been quick to win recognition

GRAM Optimizes the Memory of 8088 and 80286 PCs

Once you know where you can move those memory-hogging utilities, GRAM lets you do it. It even works on 8088, 8086 and 80286 PCs with EMS 4.0 or EEMS memory boards.

GRAM and Manifest help you get every last 'K' out of the hardware you own.

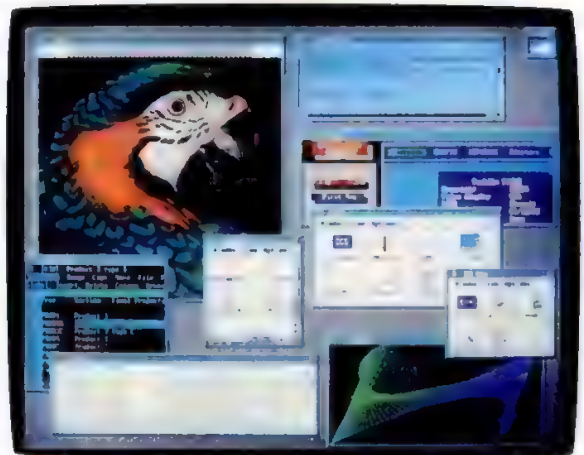
In fact, all our products are designed to give you more productivity out of the system you already have, whether 8088, 8086, 80286, 386SX, 386, or i486.

Quarterdeck Products for Everyday Heroes

Our mission is to protect your investment. Whether your PC is 9 years old or fresh out of the box, our products make it more versatile, more flexible; and help deliver performance dividends from your computer investment. Our products help fine-tune your PC which helps you do your work better, which makes you look good.

A Glimpse of the Future: DESQview/X

We're also looking ahead to the next wave of computer development: enterprise computing. Our new



DESQview/X allows different computers with different operating systems to work together. Using the advanced X-windows environment, it lets users run programs on remote computers and watch them run in their PCs' windows. DESQview/X will be available later this year.

Quarterdeck products. The best way to get the most out of your PC today. And tomorrow.

Quarterdeck

150 Pico Blvd., Santa Monica, CA 90405 (213) 392-9851 Fax (213) 399-3802

PRESENTATION GRAPHICS

FACT FILE

CA-Cricket Presents, Version 1.3

Computer Associates International Inc.,
1240 McKay Dr., San Jose, CA 95131;
800-531-5236, 408-432-1727.
List Price: \$199

Requires: 286-based PC or better, 1MB RAM, hard disk, EGA or VGA video graphics adapter, mouse, DOS 3.1 or later, Microsoft Windows 3.0.

In Short: The latest version of CA-Cricket Presents has greatly enhanced word-charting capabilities and a new low price, but these benefits are more than offset by unnecessarily complicated dialog boxes, arbitrarily limited tools, and erratic performance.

CIRCLE 402 ON READER SERVICE CARD

You can't import a spreadsheet with an empty cell at the A1 position, nor can you graph a worksheet that has noncontiguous information. *Cricket* doesn't recognize named ranges, can't create hot links, won't invert *x* and *y* axes upon import, truncates any file that exceeds its four-series limit, and is illiterate where formulas are concerned.

With only eight simple chart types, a small data set (20 points in each of four series), and very limited formatting options (uneditable axis scales and a single default legend), *Cricket's* charting capabilities are just as simple-minded. Despite *Cricket's* object-oriented nature, changing format options means that you must work through frustratingly deep layers of dialog boxes. For instance, you must open no less than four dialog boxes simply to modify a headline in a chart! Computer

Associates suggests that you turn to their \$195 *Cricket Graph* for more sophisticated charts, but you can import such graphs only as graphics through the Windows clipboard, and in the process you lose all links to the related data sheet.

WINDOWS CONVENIENCES

CA-Cricket Presents boasts many of the convenience features that users have come to expect from Windows-based presentation packages. In the title and slide views, reorganizing a show is as simple as clicking and dragging words and pictures to new locations. And because you can open four presentations simultaneously, copying slides between presentations is a snap. Yet many of *Cricket's* potentially powerful features are poorly implemented.

For instance, the program stores all related slides, speaker's notes, and audience handouts in one presentation file; it even creates the last two items automatically. However, unless you accept the default layout for speaker's notes, you will have to move and resize the slide images manually. In addition, sketch mode, designed to convert color objects to black-and-white outlines for quick drafts on a monochrome printer, proved to be totally ineffective. When applied to speaker's notes pages, it merely removed the background color from the thumbnail, causing all white type to disappear.

Even the well-equipped drawing toolbox is marred by the program's limit of 5 predetermined line weights, 5 line styles, and 15 fill patterns. Unless you can modify your aesthetic to fit these built-in restrictions, you'll be better served by using

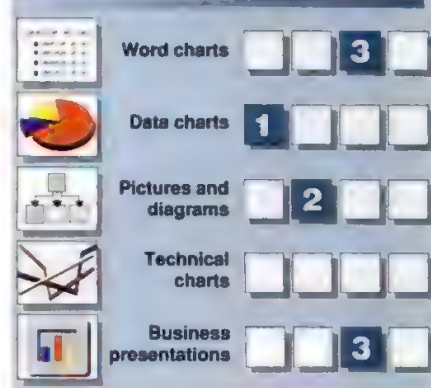
one of the included clip art images (though their quality leaves a lot to be desired), or by importing pictures created in a dedicated drawing program.

The good news is that you can easily remap the colors in the source file to the current palette; you can also use the more sophisticated group/ungroup, alignment, and node editing tools to modify images. Though the palette scheme (which requires you to keep track of both a Master and Active palette) could be streamlined, *Cricket's* support of 256 on-screen colors ensured that our test graphics were displayed properly.

Performance can still be a problem as well. The complex graphic files in our test

Suitability to Task

CA-Cricket Presents

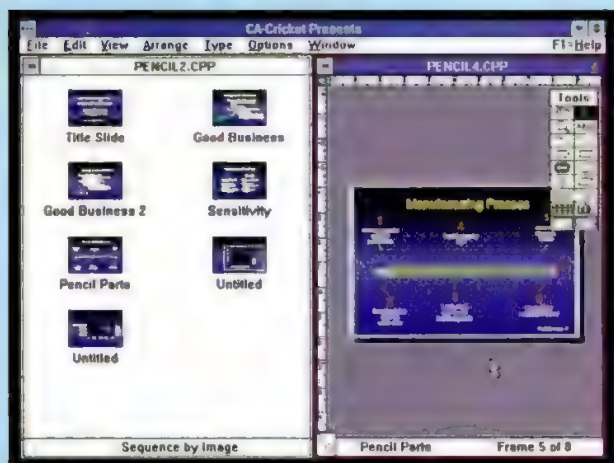


presentation slowed the program down and may have been responsible for the problems with *Cricket's* text editing window, which proved prone to incorrect screen redraws and system freezes. Computer Associates says it is planning an update that should address many of the problems we experienced during testing.

SHOW-OFF SLIDES

Despite these difficulties, the end results are as eye-catching as you'll find. *Cricket Presents* comes with an easy-to-use utility (CA-Agrx) that lets you transmit files to the Autographix slide service bureau by modem or on a floppy disk, though in our tests it proved impossible to order more than one set of slides through it. Its screen-show utility offers password protection, a looping option for a self-running demo, and 13 special-effects transitions.

Every program in this category represents a trade-off between power and convenience. Unfortunately CA-Cricket Presents often chooses to arbitrarily limit



CA-Cricket Presents' graphical interface lets you manipulate your slides visually: Its slide sorter view lets you rearrange them simply by dragging the thumbnails.



To understand
the basic
principle behind
Fastback Plus,
tear out
this page
and destroy it.

LIKE A BOLT FROM THE BLUE,

your hard disk will eventually come crashing down. Manufacturers expect it. They even give hard disks an "MTBF" rating—the Mean Time Between Failures.

Before you lose your valuable data, back it up with Fastback Plus.

BACKUPS IN A FLASH With Fastback Plus, you can do things that DOS Backup never dreamed of. Like back up all your daily file changes in less than a minute. Or blaze through your entire hard disk at three megabytes a minute on 386 machines, or 10 megabytes in four minutes on an AT. It even formats your backup diskettes – automatically.

STRIKING SIMPLICITY Fastback Plus has three user levels – beginner, intermediate and advanced. Simple menus tell you how long your backup will take, and how many diskettes you'll need. And a unique data compression feature cuts the number of diskettes you need in half. You can even automate the entire process with one-touch macros.

DAZZLING SAFETY Only Fastback plus gives you reliable Advanced Error Correction. To illustrate, we punched a hole

larger than a .22 calibre slug right through a backup diskette – and retrieved all the data! That's security. And if you need help dodging even bigger bullets, our technical support staff will surprise you with its courtesy and ingenuity. Just call, and you're guaranteed same-day service.

GLOWING REVIEWS *PC Magazine* said it best in giving Fastback Plus its prestigious 1989 Editor's Choice Award: "Fastback Plus has virtually everything a backup program needs: top-speed performance, clear menus, every imaginable option, even a built-in macro program for automating complex tasks. A superb achievement."

A POWERFUL GUARANTEE Use Fastback Plus for 30 days, and if you're not completely satisfied, return it for a full refund. You have nothing to lose. And everything to save.



FREE PYRO For a limited time, get a FREE copy of Pyro!™, our popular screen-saving program just for writing "Pyro" on the Fastback Plus registration card before you return it. That's a \$49.95 value – free!

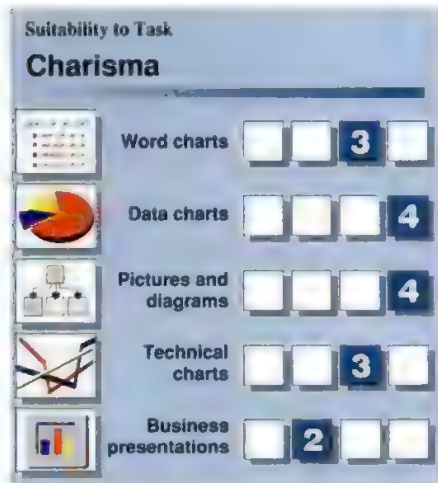
Call now for complete details and the dealer nearest you.

1 - 8 0 0 - 8 7 3 - 4 3 8 4

charts doesn't accurately reflect the chart labels, making chart placement a rather difficult task.

TOO DEVICE DEPENDENT

Though *Charisma* is good at creating the elements of a presentation, producing equally attractive output can be fraught with difficulty. The program contains some very useful features, such as the ability to print discontinuous pages; in



addition, a flexible batch-print utility lets you print to multiple output devices simultaneously.

Unfortunately, the presentations are far too device-dependent, causing problems when you switch from your proof device to your final output. Suppose you create a presentation for the display, which lets you view the maximum number of pages simultaneously as you're working. If you then try to change devices to go to a laser printer, all your painstakingly created images will be horribly misaligned;

those rectangles on the grid, it turns out, are just *guidelines* for the output device, not actual pages. Since the package maps to gray scale instead of black and white, a presentation that has white characters on a dark background on film will lose the white characters entirely when output to a laser printer.

The only way you can conveniently get around these problems is by creating separate versions of your presentation for each output device. Luckily, duplicating presentations isn't as odious a task as it could be, since *Charisma* allows you to open multiple presentations simultaneously (interestingly, it opens up another kernel of itself for each one rather than opening separate windows within the main application).

For creating slides, *Charisma* conveniently comes bundled with Telegrafx, the well-designed communications program that lets you transmit your slides to Slide-masters or MAGICorp. The program also comes with a very flexible screen-show facility, but since *Charisma* does not yet properly support the Windows 256-color mode, the screen-show facility is forced to use dithered colors. This makes screen updates too slow for effective PC-based presentations.

For quickly churning out presentations with a consistent appearance, especially if you want to print them on various output devices, *Charisma* falls short of ideal. But *Charisma* does have strong charting and drawing capabilities, and this point alone makes it a good choice if you need to create more image-oriented presentations with complex charts.

DrawPerfect

by Ronni Geist and Harry Geist

DrawPerfect (\$495) is WordPerfect Corp.'s entry into the graphics arena; this family tie is its most notable strength. *DrawPerfect* works directly in WordPerfect's native graphics format (.WPG), though it can import and export a wide variety of other formats. The WordPerfect shell, which comes free with *DrawPerfect*, integrates the two products closely through macros.

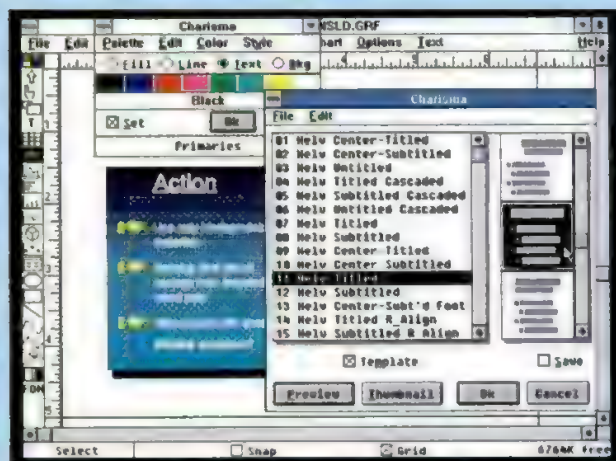
Those familiar with WordPerfect will find *DrawPerfect* has a familiar feel. Although you can use a mouse, *DrawPerfect*'s keyboard-based heritage is apparent. *DrawPerfect* performs well through function-key commands, and many of its keystrokes are the same as those in the word processor. But its mouse maneuvers differ from the traditional click, double-click, and click-and-drag sequences to which most users are accustomed. For example, to draw an object, you must click twice, once for the first anchor point and then again for the second anchor point, instead of just clicking and releasing.

CHARTING A STRAIGHT COURSE

DrawPerfect shines as a tool for creating charts and drawings for WordPerfect documents. It offers all the charts and variants most business users are likely to need and imports data effortlessly from Lotus 1-2-3, Excel, PlanPerfect, or Quattro spreadsheets. (In our testing, though, *DrawPerfect* imported only numeric data, not labels.)

Creating a link from a chart directly to a spreadsheet file is uncomplicated, and updating the graph with new data is automatic. *DrawPerfect* falls short in just a few minor details: For example, you cannot explode a slice from a 3-D pie chart or change its depth or viewpoint, and in a 2-D pie chart, you have no control over how far slices are exploded.

DrawPerfect's drawing tools are equally robust, making it easy to add pizzazz to your charts and graphs. You can easily cut and paste from one of two active drawing screens to the other. The package comes with over 500 pieces of professional-looking clip art that you can use as full-sized backgrounds, embellishments, or as bullets in word charts. The program's excellent tutorial manual gives you detailed instructions on how to use clip art to



In addition to free-form word charting, you can use one of *Charisma*'s predefined templates, which provide numerous typeface and placement variations on the basic title/subtitle/text-with-bullets theme.

FACT FILE

DrawPerfect, Version 1.1

WordPerfect
Corp., 1555 N.
Technology Way,
Orem, UT 84057;
(801) 222-5003.
List Price: \$495

Requires: 286-based PC or better, 1MB RAM,
hard disk, graphics adapter, DOS 2.0 or later.
Mouse recommended.

In Short: With good charting and better-than-average drawing capabilities, *DrawPerfect* makes a good choice for the DOS user, for whom its close integration with *WordPerfect* makes it a natural.

CIRCLE 404 ON READER SERVICE CARD

GRAPHICS PRESENTATION GRAPHICS

change its attributes without deleting and reentering it. Though you can import text from *WordPerfect* with bold, italic, and underline attributes intact, other special characteristics, such as columns and type styles, will be lost.

DrawPerfect cannot use any type of standard printer fonts. Instead, it uses its own proprietary fonts, which are different from *WordPerfect*'s. If you wish to retrieve a *DrawPerfect* chart as a graphic in *WordPerfect* with fonts intact, *WordPerfect* must access the *DrawPerfect* font file (WP.DRS), which the documentation recommends copying into your *WordPerfect* subdirectory.

You can use *WordPerfect*'s spell-checker (via the Shell) to spell-check your presentations, but you should be aware that each text box must be checked individually. This can be a tedious process if you have many slides to verify. To create speaker's notes or handouts with multiple graphs on a single page, you must resize screens manually or import them into a *WordPerfect* document.

NO THRILLS FROM AUTO FILL

DrawPerfect supports 256 colors and offers 64 distinctive fill patterns, which it automatically substitutes for colors when printing black-and-white output. Also included in the package is a conversion utility that will remap colors to 16 shades of gray. You must run this utility from the DOS prompt, however; you can't use it directly from *DrawPerfect*'s menus.

DrawPerfect offers a runtime screen-show module. This feature is flexible enough to run a show created on a VGA

Suitability to Task

DrawPerfect

	Word charts	☐	☒	☐	☐
	Data charts	☐	☒	☐	☐
	Pictures and diagrams	☐	☐	☒	☐
	Technical charts	☐	☒	☐	☐
	Business presentations	☐	☒	☐	☐

monitor on an EGA-based system without conversions or modifications. *DrawPerfect*'s on-screen fonts leave something to be desired, however.

While *DrawPerfect* is not the glitziest presentation package on the market, it does possess some impressive features. If what you need is a basic set of charting tools, powerful editing tools, and an extensive figure library, then *DrawPerfect* can help you get the job done.

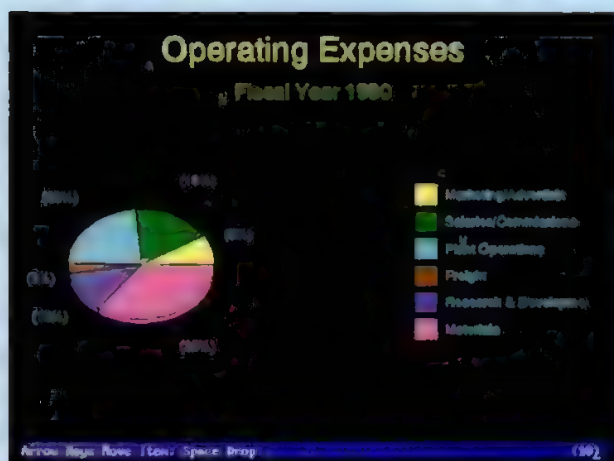
Freelance Graphics for OS/2

by Craig Stinson

Don't be misled by the name. *Freelance Graphics for OS/2* feels and looks nothing like its well-known DOS namesake. Although it reads and writes *Freelance Plus* .DRW and .PFL files, Lotus's newest presentation graphics program (\$595) has been completely redesigned for its graphical operating environment.

The main business of *Freelance Graphics for OS/2* is to provide an easy-to-use system, free of aesthetic hazards, for those who want to achieve classy presentations in a hurry. And although it's hobbled by Presentation Manager's gluttonous memory appetite and a few shortcomings in its implementation of the PM interface, it achieves that goal admirably.

The heart of the program is a set of prefabricated presentation templates called *SmartMasters*. A *SmartMaster* consists of nine master pages, each of which is tailored for a different type of slide. There's a title page, pages for one- and two-column bullet lists and other word charts, pages to accommodate various numbers of graphic images or data charts,



DrawPerfect supports a mouse, but it's designed for use with the keyboard as well. To move the titles, legend, or location of the pie, you simply type the letter associated with the desired item to select it, then reposition it using the Arrow keys.

a page called Shared Elements, and another called Backdrop. All the pages of a given SmartMaster share a common design theme that you can use as the basis for creating additional master pages—should the nine default pages fail to suffice.

The 31 SmartMasters furnished with the program cover a range of styles, from no-nonsense to arty. You can completely remake the mood of a finished presenta-

tion simply by switching master sets. And if none of these templates is quite right, you can either edit the one that comes closest or use drawing tools and straightforward commands to create your own.

To create a routine presentation, you

BEYOND THE SCREEN SHOW: PC-Based Presentation Packages

by Robert Kendall

The PC monitor has become an excellent medium for business presentations. With today's powerful laptop PCs, you can carry everything you need with you, sparing yourself the aggravation of waiting for output from a service bureau and the trouble of hunting around for a slide projector at the last minute.

The better presentation graphics packages offer screen show utilities. These let you parade your images on-screen with the help of fades and wipes and variable delays; they will pause at any point to wait for a key press. Some have runtime modules for distribution, and *Harvard Graphics* even offers "hyperlinks" that let you navigate around your presentation interactively by clicking on "hot" areas of an image.

If you rely regularly on PC-based presentations, however, you may prefer a product designed especially for creating them. *IBM Storyboard Live!*, Brightbill-Roberts' *Show Partner F/X*, and *V_Graph's VirtualVideo Producer* offer a number of additional benefits. Based on script languages, these special-purpose packages offer more-complex and more-flexible branching, as well as better screen control, than the average presentation graphics program. They let you alter the colors of an image while it's being shown and clip out parts of images to display as successive overlays for complex builds. They even let you venture into the realm of multimedia, holding your audience's attention with animation and synchronized sound.

START WITH A SCRIPT

IBM Storyboard Live!, *Show Partner F/X*, and *VirtualVideo Producer* all work on the same basic premise. To create a presentation, you simply enter a presentation script (which defines the sequence of visuals to be displayed) in a table, where each row represents a presenta-

tion event. All have screen-capture programs that let you incorporate anything you can display on-screen. For animation, you simply position clips or animated sprites on the image by using the mouse. All three products let you cut and paste sections of your script, so you can rapidly build up presentations out of reused common elements.

The packages differ widely, however, in sophistication and level of detail. Of the three, *IBM Storyboard Live!* is the most feature-laden: It supports both MIDI sound files and audio boards and can even incorporate full-motion video from videodisks. At \$495, it's also the most costly.

Storyboard offers two ways of managing your presentation. A familiar table-like script editor, which lets you add transition effects and delays, also includes a small window that lets you follow your script line by line as it executes. For users who favor a more visual editing approach, a second module presents rows of thumbnails that you can reorder by dragging them with the mouse. From the script editor, you can then load the sprite editor for creating animations or the very capable paint editor for altering your individual images (it imports TIFF, GIF, *Windows*.BMP, and .CGM as well as .PCX files).

Storyboard has the most sophisticated animation capabilities of the bunch. You can easily craft shrinking or expanding text labels, exploding pie charts, or growing bar charts (though aligning the bars properly with a grid is a chore). It has a few problems, including flicker in 640-by-480 resolution, that *IBM* is working to rectify. But overall it offers the best screen shows available without programming.

A SHOWY PARTNER

Brightbill-Roberts' \$395 *Show Partner F/X* shares *Storyboard*'s modular orien-

tion but lacks the ability to switch easily between the modules. It makes up for this deficiency by the strength of its flow-control capabilities. With *Show Partner*, you can easily branch to a specified location in your screen show and set variables during a presentation no matter what the current image. *Show Partner* will even load alternative graphics files automatically if a display system doesn't support a particular file's resolution.

Show Partner is also less fancy than *Storyboard* in the animation department. Its sprite editor won't automatically create multiframe animations. However, it lets you keep several sprites active at once in a presentation, and moving the sprites across the screen is easier than in *Storyboard*.

Other features include a simplified version of the script editor that displays successive images with delays and transition effects, a customized on-screen pointer that you can move with the mouse while you address an audience (a feature shared with *VirtualVideo Producer*), plus support for MIDI and sound boards.

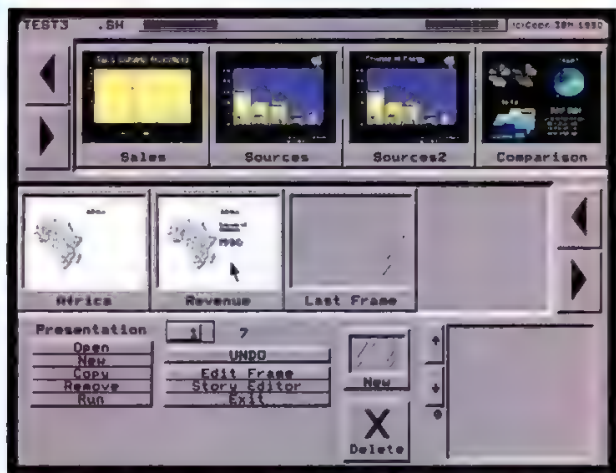
The package is weak in some aspects of screen display, however. Fades and wipes are so slow at a 640-by-350 or higher resolution that they're not practical for full-screen images. The program also won't let you make the background colors of clips transparent when you overlay them on an image.

ATTRACTIVE AND INEXPENSIVE

VirtualVideo Producer (priced at \$199, plus \$25 for *Grab & Cut*, a screen-capture and image-clipping utility) offers an attractive alternative to its more expensive competitors. It's also easier to use than the other screen-show utilities and offers some appealing features that they lack, such as support for Super VGA. *VirtualVideo Producer* doesn't include a paint module, but you can load

handle it. When you've finished creating your slides, just change to the slide sorter view, use the mouse to put your slides in the order you want, then print.

Freelance Graphics for OS/2's style-sheet approach also extends to color selection. Each SmartMaster set is assigned by default to one of the program's 14 18-color palettes, but you're welcome to switch. In



your own .PCX editor from within the script editor. It will also scale .PCX images on the fly during a presentation, saving you from resizing.

vehicle for an entire business presentation. But teamed up with *VirtualVideo Producer*, they can create some rather striking moments.

type the text in the script editor and position it on-screen with the mouse. Similarly, to add menus for branching a presentation, you just type menu options and branching instructions into the script and the program creates the menu for you.

Overlaying text of more than ten characters is problematic, though, since you must first create an ASCII file to do this. And unlike the other packages, *VirtualVideo Producer* can't create frame-based animation for such effects as a bird flapping its wings. You'll have to settle for moving a clip from an image across the screen, often none too smoothly.

To compensate for this deficiency, *VirtualVideo Producer* lets you dress up your presentation with animation files created by *Autodesk Animator* or selected from *Autodesk's* library of *Animator* clips. Since *Animator* sequences are limited to a relatively low resolution of just 320-by-200 pixels, they're not always the best possible

tion System for Professionals), an animation language that lets you string together .PCX files and captured screens, use fades and wipes, overlay clips and text, create branching options, add digitized sound effects, play *Autodesk Animator* flicks, or—should you so desire—create your own animations. This requires a more concentrated investment of time and effort than most business presenters may be willing to make, but professionals creating presentations for others will find it to be a useful and productive tool.

Eventually the advance of multimedia will allow personal computers to offer a level of interactivity that would be inconceivable with old-fashioned projection systems. But you don't need to wait for that day to use your PC as the medium to deliver the message. ■

IBM Storyboard Live!, Version 1.0
IBM Desktop Software, P.O. Box 2150,
Atlanta, GA 30035; 800-426-7699.

List Price: \$495 **Requires:** 640K RAM; hard disk; EGA, VGA, or 8514/A graphics adapter; DOS 3.3 or later. Mouse recommended.

CIRCLE 398 ON READER SERVICE CARD

Show Partner F/X, Version 3.6
Brightbill-Roberts & Co., 120 E.
Washington St., #421, Syracuse, NY
13202; 800-444-3490.

List Price: \$395 **Requires:** 384K RAM; CGA, EGA, Hercules, MCGA, or VGA graphics adapter; mouse; DOS 2.0 or later.

CIRCLE 399 ON READER SERVICE CARD

VirtualVideo Producer, Version 3.5
V_Graph Inc., P.O. Box 105, 1275
Westtown Thornton Rd.
Westtown, PA 19395; 215-399-1521.
List Price: \$199; *Grab & Cut*, \$25;
VirtualVideo Font Factory, \$250.

Requires: 640K RAM; hard disk; CGA, EGA, VGA, or Super VGA graphics adapter; DOS 2.1 or later.

CIRCLE 400 ON READER SERVICE CARD

GRAPHICS

PRESENTATION GRAPHICS



FACT FILE

Freelance Graphics for OS/2 Version 1.0

Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617-577-8500.

List Price: \$595

Requires: 286-based PC or better (386-based PC recommended), 4MB RAM (5MB recommended with 1-2-3/G), hard disk; EGA, VGA, or 8514/A graphics adapter; mouse; OS/2 1.2 or later (OS/2 1.3 recommended).

In Short: *Freelance Graphics for OS/2's* style-sheet approach to presentation design and color selection, its tight integration with 1-2-3/G for charts, and its robust set of drawing tools make it one of the most powerful graphics packages you can buy. The OS/2 environment imposes large hardware requirements and the paucity of drivers available for OS/2 means that few will find it a practical choice, but it's a good preview of Lotus's upcoming *Windows* program.



CIRCLE 405 ON READER SERVICE CARD

black-and-white palette for the entire presentation. And if you don't want to bother, the program can map colors to fill patterns as well as to gray scales according to your own specifications.

AS EASY AS 1-2-3 (G)

Freelance Graphics for OS/2 fits hand in glove with 1-2-3/G for charting. In fact, DLL technology allows the two programs to share a common charting component. Only one copy of the charting module is loaded when both programs are running (a good thing, since you'll need at least 6MB to run the two applications simultaneously). This connection gives you a particularly rich set of features for creating and customizing charts. It also lets you link your *Freelance Graphics* charts to named ranges in .WKG files so that your slides change automatically with your source data.

Unfortunately, though the charting component of *Freelance Graphics* accepts data from the PM clipboard and supports PM's Dynamic Data Exchange (DDE), it recognizes no other spreadsheet formats—not even the ubiquitous .WK1 file. So if you have other Presentation Manager applications, you may be able to create live links to data sources other than 1-2-3/G. But if *Freelance Graphics* is all you have, you're forced to key in chart data manually.

Freelance Graphics has other assets, including some 500 pieces of clip art (you can also import CGM files), text boxes with 16 styles of automatic bullets, and a full complement of drawing tools. Points can be edited singly or in groups and tools

Suitability to Task

Freelance Graphics for OS/2

	Word charts		4
	Data charts		4
	Pictures and diagrams		4
	Technical charts		1
	Business presentations		3

can be customized so that, for example, all rectangles come up with dark blue borders by default. You can create compound objects (a polyline plus a Bezier curve, for example) simply by clicking on a new tool before closing the previous object, and there's a handy "select like" feature that lets you apply a formatting change to all elements with a common attribute (even if they're on separate presentation pages). There are 20 levels of undo—good news for those with shaky hands.

LACKING AMENITIES

On the other side of the ledger, the program lacks a few basic amenities, such as automatic drop shadows. The user interface is consistent with the conventions established by 1-2-3/G. It's as keyboard-pliable as a GUI program can be, but it suffers from a few curious design lapses: Unavailable options are not always dimmed, for example, and to get Encapsulated PostScript output, you must supply filenames in two different dialog boxes (the system disregards one of the names).

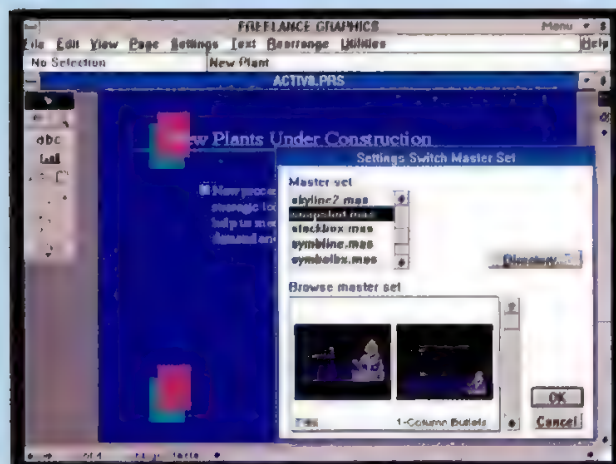
Ultimately, the OS/2 environment itself acts as a limitation. With a mere 4MB of RAM, the recommended minimum, you'll grow old watching the program fetch every menu and dialog box from disk; consider 6MB a practical requirement. And OS/2's slow start in the market means that drivers for film recorders are impossible to come by. At press time, Lotus was working on an arrangement with Autographics for slide production, but prospects for a communications link were hazy at best. PostScript is just about your only real option for quality color output.

A functionally equivalent *Windows* version of *Freelance Graphics* is said to be on the way, and, judging from this

effect, palette switching creates 14 distinct variants of each SmartMaster set.

Like the master sets themselves, the palettes are editable. You can change the supplied sets or create new sets by selecting from a "library" of 120 colors. You can also override the current palette locally and apply so-called "library colors" to particular slide elements so that they remain the same even if you switch palettes. Thus, if your company's logo is blue and white, you can easily make sure it won't turn pink and gold.

Freelance Graphics for OS/2 is one of the best packages around when it comes to monochrome output. You can easily switch between your color palette and a



You can change the look of a *Freelance Graphics for OS/2* presentation instantly by choosing a new slide master. The dialog box gives you a preview of each available master.

ef look at the
d a few minutes
y of type.
ercase "x" occupies
ve the x-height ("b")
ow the x height ("p")

- **Serifs:** the extensions, or finishing strokes on each letter in some typefaces (Times Roman)
- **Sans serif:** a typeface without serifs (Helvetica)
- **Points:** typeface sizes are designated in points; there are approximately 72 points to an inch
- **Fixed-pitch type:** each letter is allocated the same amount of width space ("h i m")
- **Proportionally-spaced type:** the space each letter occupies varies—for example, an "i" takes up less space than an "m" ("him")

Ascender
abet — x-Height
San Serif

scalable outline fonts are mathematical
, they need to be interpreted by a font
before they can be printed.

renderer: a scheme for interpreting the
mathematical formulas of scalable fonts into
ble characters

One! cartridge offers bitmapped fonts
ed for high legibility, ranging in size
points to 18 points. Our *PacificPage* and
Font Library Cartridge offer high-quality
onts that can produce a character as
his page or as small as you can read.



Pacific
anufac-
tory
stment

**AID
STATION**

Aid Stations: that teach
you about fonts and page
description languages

**Check
Point**

Checkpoints: that guide
you to the right product
for your application

FIC
DUCTS

**AID
STATION**

4

Page Description Languages— PostScript and HP PCL

A page description language is a computer programming language that describes the placement and appearance of text and graphics on a page. The two most widespread and supported page description languages (PDLs) for laser printers are Adobe PostScript® and Hewlett-Packard PCL.

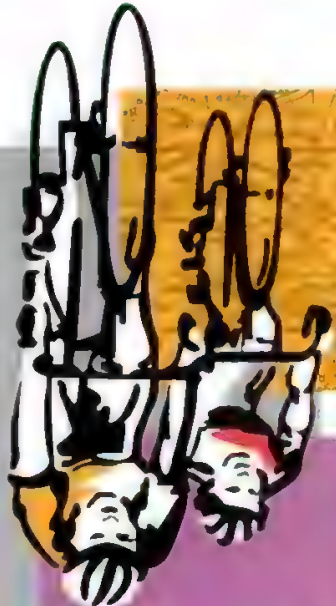
PCL was developed by HP as a common language for describing pages on their LaserJet line of laser printers. A version of PCL is built into every HP LaserJet printer; the original LaserJet and the LaserJet Series II family are PCL 4 printers, while the recently introduced LaserJet III family is PCL 5, which offers PostScript-like features.

PostScript, on the other hand, was not specifically developed for any printer, although it first became popular on the Apple LaserWriter. It was developed as a common language for describing pages to almost any output device, such as printers, typesetters, and slidemakers. This broad support for PostScript has made it the language of choice for users who ultimately send output to a typesetter or slidemaker. It's also the language of choice for those who want high-quality text and graphics and access to thousands of PostScript-compatible fonts and software applications.

The main advantages of using PostScript versus PCL 5 include

- Broader software driver availability
- Larger number of typefaces available
- Compatibility with typesetters and slidemakers

PostScript language emulation cartridge for HP LaserJet Series II, III, IIIi, IIIx and IIId printers



Demi, Light Italic, Demi Italic
Univers Medium Condensed
Bold, Medium Italic, Bold Italic
Antique Olive
Bold, Italic, Compact
Stymie Medium
Bold, Medium Italic, Bold Italic
 ITC Zapf Dingbats
 ITC Zapf Dingbats
 Shannon Book
Bold, Oblique, Extra Bold
CG Bodoni Book
Bold, Book Italic, Bold Italic
CG Omega
Bold, Italic, Bold Italic
ITC Bengaliat Book
Bold, Book Italic, Bold Italic
ITC Bookman Light
Demi, Light Italic, Demi Italic
Garamond Antiqua
Halbrett, Kursiv, Kursiv Halbrett
Cooper Black
Lettaset Revue Light

PacificType Typesyles

ITC Garamond
Book, Book Italic, Bold, Bold Italic
Zapf Humanist (Optima)
Normal, Italic, Bold, Bold Italic
Zurich™ (Univers)
Roman, Italic, Black, Black Italic
Goudy Old Style
Roman, Italic, Bold, Extra Bold
Baskerville
Roman, Italic, Bold, Extra Bold
Futura Book, Extra Black
Futura Light
Light, Light Italic, Medium Condensed
Medium Condensed
Black
Swiss Monospaced Roman
Swiss Light (Helvetica Light)
Light, Light Italic, Black, Black Italic
State
Medium, Medium Italic, Bold, Extra Bold
Univers™ Roman
Cloister Black
Bitstream Cooper Black
Blippo
Park Avenue™ Roman

PacificPage P.E. Typesyles

Courier
Normal, Bold, Italic, Bold Italic
Swiss 221
Normal, Bold, Italic, Bold Italic
Swiss 721 Narrow
Normal, Italic, Bold, Bold Italic
Dutch 801
Normal, Bold, Italic, Bold Italic
Zapf Calligraphic 801 (Palatino)
Normal, Bold, Italic, Bold Italic
Geometric 711 (ITC Avant Garde)
Normal, Bold, Italic, Bold Italic
Revival 711 (ITC Bookman)
Normal, Bold, Italic, Bold Italic
Century 702 (Century Schoolbook)
Normal, Bold, Italic, Bold Italic
Chancery 801 (ITC Zapf Chancery)
Medium Italic
Zapf Dingbats
Symbol
apxδεφγηκλμνρστυφωρστυ

Product Profile

Printer Compatibility
 PacificPage for the HP LaserJet Series II printer
 PacificPage P.E. for the HP LaserJet III, IIIi, IIIx and IIId printers
 PacificPage XL for the HP LaserJet III, IIIi, and IIId printers
Software Compatibility
 Compatible with all applications that support PostScript printers
Requirements
 PacificPage for the LaserJet Series II and PacificPage XL come standard with 2 MB of memory—no additional memory is required
 PacificPage P.E. requires an additional 1 MB of memory (2 MB for complex documents, legal, or A4 paper and for use with PacificType)

PDP

25 IN ONE! III

Font cartridge for HP LaserJet Series II, IIP, IID, III, IIID and IBM laser printers

Product Profile

172 fonts and symbol sets in one cartridge

High-quality bitmapped fonts, hand-tuned for optimal legibility

Custom printer drivers for popular applications allow easy access to the fonts and symbols

Prints instantly—no downloading soft fonts

Perfect for general, legal, technical, and scientific word processing, tax forms, and spreadsheet applications

Lifetime warranty for original purchaser

Printer Compatibility

HP LaserJet Series II, IIP, III, and IIID printers

IBM LaserPrinter 4019 and 4019E

Software Compatibility

WordPerfect 4.2, 5.0, 5.1; MultiMate Advantage II; Lotus 1-2-3 Rel. 1A-3.0; Windows 286/386, 3.0; Word 3.0, 4.0, 5.0, 5.5; WordStar 2000 Rel. 3.5, WordStar 5.0, 5.5, 6.0; XyWrite III Plus; Symantec Q & A; DisplayWrite 4.2; Ventura Publisher 2.0, 3.0; Professional Write 2.2; Borland Quattro Pro

25 in One! for IBM

Windows 286/386, 3.0; WordPerfect 5.1; Word 3.0, 4.0, 5.0, 5.5; WordStar 5.0, 5.5, 6.0; DisplayWrite 4.2; Ventura Publisher 2.0, 3.0

International Support

Full Roman 8, ECMA-8, and ISO-7 international symbol sets. Characters, punctuation, and currency symbols for U.K., French, German, Spanish, Italian, Danish, Norwegian, Swedish, Greek, and Latin languages

172 Fonts and Symbols

Typestyles	POINT SIZE										SYMBOL SETS										EQUIVALENTS
	8	10	12	14	16	18	20	24	36	48	ROMAN 8	ISO 7	U.S. & CAN.	U.K.	FRANCE	GERMANY	SPAIN	ITALY	DENMARK	NORWAY	
Helv Style																					
Medium	P																				T, Z1A
Bold	P																				B, F, S2, Z1A
Italic	P																				Z1A
Medium	L																				V
Bold	L																				V
Tms Rmn Style																					
Medium	P																				B, F, S2, Z1A
Bold	P																				B, F, S2, Z1A
Italic	P																				Z1A S2
Medium	L																				P
Bold	L																				P
Italic	L																				P
Tms Math/Pi	P																				K
Prestige Math/Pi	P																				J
Medium	P																				A, C, H, G, S1, Y
Italic	P																				A, C, H, G, S1, Y
Bold	P																				A, C, H, G, S1, Y
Prestige Elite																					
Medium	P																				G, J
Bold	P																				D, G, U, M
Italic	P																				D, G, U, M
Medium	L																				G, H, M
Bold	L																				D, G, M
Italic	L																				D, G, M
Letter Gothic																					
Medium	P																				R, N, W
Bold	P																				E, N
Italic	P																				E, N
Medium	L																				N, R, V
Bold	L																				N
Italic	L																				N
PRNTATN																					
Bold	P																				R
Bold	L																				R
Line Printer	P																				C, F, Y, L
Line Printer	L																				A, B, C, L, Y, Z1A
PC Line Draw	P																				R
PC Line Draw	L																				R
Tax Line Draw	P																				T
AFS	P																				POP Can
AFS	L																				POP Can

All portrait fonts can be printed in landscape orientation on printers with automatic font rotation. (LaserJet IID, IIP, III and IIID, and IBM LaserPrinter 4019 and 4019E)

Check
Point
B



Scalable font cartridge for HP LaserJet III and IIID printers

The Complete Font Library Cartridge Typestyles

CG Century Schoolbook
Bold, Italic, Bold Italic
CG Palacio
Bold, Italic, Bold Italic
ITC Souvenir Light

Tour de Font

A Selection Guide to
Font and Language Emulation
Cartridges for HP LaserJet Printers

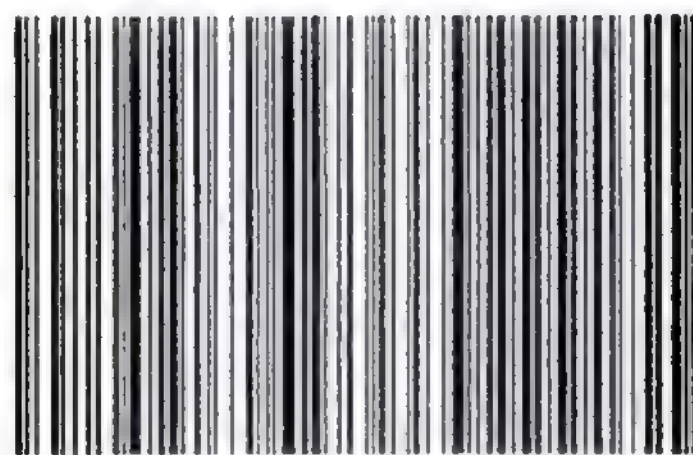


PACIFIC
DATA PRODUCTS

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



Inverted Foldout slip-sheet

Folded edge of the page

1. Open the foldout page

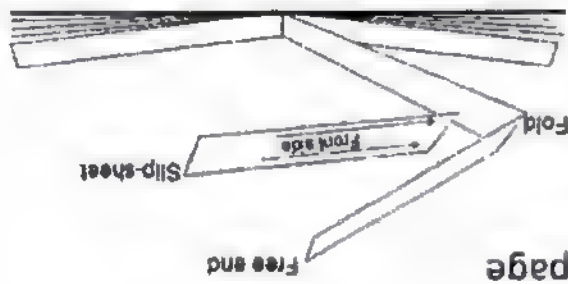
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

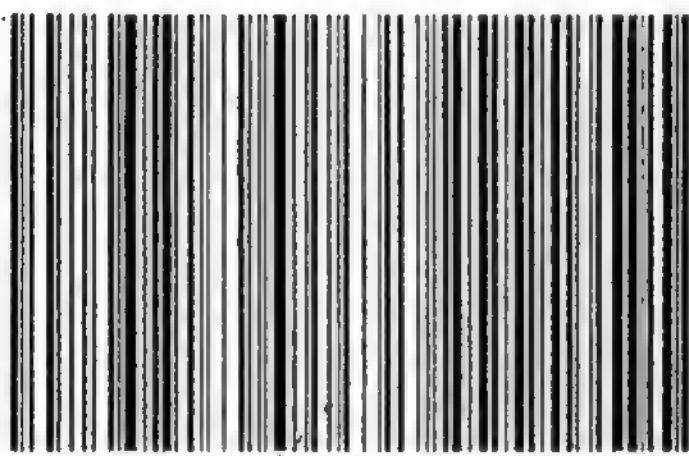
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-0018

Back

1. Follow instructions on the other side

START

The anatomy



Type, much like a bicycle, is fundamentally a form of transportation. A bicycle delivers you from point A to point B, while type delivers your message.

But both go beyond merely utilitarian purposes. Just look at the innovative angles and lines of today's racing bicycles; they're not only functional, they're emotional and stylistic. They make a statement about the rider. Type invokes the same response. Type can be bold or subdued. Professional or casual. And because type is a graphical element, it can create an impression or set the mood.

Today you have almost complete control over the appearance of your documents. But with this power also comes the burden of understanding your choices. We hope this tour helps you better understand the powerful choices available from Pacific Data Products.



This stop offers another brief look at the world of typography. Spend a few minutes to understand the anatomy of type.

- **X-Height:** the area above the baseline and below the x-height line
- **Ascender:** any part above the x-height line
- **Descender:** any part below the baseline

Point Size
Serif
Alpha
Descender



Scalable and bitmapped fonts

Since the fonts you choose for your laser printer are computerized type, it's important to understand the difference between scalable outline and bitmapped fonts.

- **Bitmapped fonts:** each character is described as a pattern of dots in a specific point size
- **Scalable fonts:** each character is described as a mathematical formula and can be any size

Because formulas are used to render scalable fonts, they can be rendered at any size.

- **Font:** a complete set of characters for a particular typeface and size.

Our 25 point font is hand-tuned from 3.6 to 144 point. Complete scalable fonts can be as large as 144 point.



The vocabulary of typography

If you're new to typography, the art and science of working with and using typefaces, stop here to learn some basic terms and definitions.

- **Typeface:** a specific design for a set of letters, numbers, and symbols (Century Schoolbook)
- **Typestyle:** a particular variation of a typeface (Century Schoolbook Italic)
- **Font:** a complete alphabet of a typestyle in one size (Century Schoolbook Italic, 10 point); Some fonts include special characters, such as mathematical and international symbols

SPONSOR

Tour de Font is brought to you by Pacific Data Products—a company that designs, manufactures, and markets cartridges, software, memory expansion boards, and other accessories that enhance the power of and protect your investment in laser printers.

Since our font and language emulation cartridges offer similar or overlapping capabilities, we developed this tour to help you understand and distinguish each product. The tour consists of:

PACIFIC DATA PRODUCTS

Team

Check
Point
A

25 IN ONE! III
172 Fonts and
Symbol Sets

PACIFIC
DATA PRODUCTS



Meet 25 in One! III, our font cartridge with 172 high-quality bitmapped fonts and symbols from the most popular typeface families.

For example, you get the Tms Rmn typeface which is highly legible and, therefore, often found in long, text-intensive documents. It also comes with Helv, a sans serif typeface commonly used for titles, headings, spreadsheets and forms.

Is 25 in One! III the right cartridge for you? Add it to your team if you answer yes to most of the following questions:

- Are your documents usually text only? (Not sophisticated, integrated text and graphics)
- Is your primary application general, legal, scientific, or technical word processing, spreadsheets, or tax forms?
- Do you generally use a common range of font sizes and types in your documents? (8 to 12 point size)
- Do you need one font cartridge that is compatible with HP LaserJet Series II, IIP, IID, III and IIID, or IBM LaserPrinter 4019 and 4019E printers?
- Do you want a cartridge that doesn't require any additional printer memory and prints very fast?

THE

COMPLETE FONT LIBRARY CARTRIDGE

Product Profile

- 51 scalable outline typestyles
- Scale typestyles to 999.75 points in quarter point increments

Software Compatibility

Microsoft Windows 2.X, 3.0,
Microsoft Word 5.0, 5.5;
Ventura Publisher 2.0, 3.0;
WordPerfect 5.1; application



Introducing The Complete Font Library

51 scalable

Language Emulation Products

PacificPage	PostScript language emulation, 35 typesets	High-quality text and graphics, low-cost, easy to use	HP LaserJet Series II printer
PacificPage P•E and PacificPage P•E for Macintosh	PostScript language emulation, 35 typesets (AppleTalk interface module included with Mac version)	High-quality text and graphics, low-cost, easy to use	HP LaserJet IIP, IID, III, and IIID printers
PacificPage XL and PacificPage XL for Macintosh	High-speed PostScript language emulation (AppleTalk interface module included with Mac version)	High-quality text and graphics 2 to 8 times faster than cartridge-only solutions	HP LaserJet IIP, III, and IIID printers
Plotter in a Cartridge	HP-GL emulation of HP7475A and HP7550A plotters	Fast check plots and high-resolution graphics	HP LaserJet Series II printers
Plotter in a Cartridge P•E	HP-GL emulation of HP7475A and HP7550A plotters	Fast check plots and high-resolution graphics	HP LaserJet IIP, IID, III, and IIID printers

Typographical Font Products

Scalable Fonts:

The Complete Font Library Cartridge	51 scalable typesets	Almost unlimited point sizes, low price, variety of typefaces	HP LaserJet III and IIID printers
PacificType (must be used with PacificPage P•E version 4.0 or higher)	40 additional typesets for use with PacificPage P•E	Almost unlimited point sizes, low price, variety of typefaces	HP LaserJet IID, III and IIID printers

Bitmapped Fonts:

25 in One! III	172 fonts and symbols	Combines fonts from HP A to Z bitmapped font cartridges	HP LaserJet Series II, IIP, IID, III and IIID printers
25 in One! for IBM	172 fonts and symbols	Combines fonts from HP A to Z bitmapped font cartridges	IBM LaserPrinter 4019 and 4019E printers
Headlines in a Cartridge	18 Helv and Tms Rmn fonts in sizes up to 48 points	Larger point size, faster and easier to use than soft fonts	HP LaserJet Series II, IIP, and IID printers

Memory Expansion Products

1-2-4 Plus Upgradeable Memory Board	0, 1, 2, or 4 MB of laser printer memory	Fully user upgradeable, lifetime warranty, low cost	HP LaserJet Series II, IID, Canon LBP-8II/LBP-8IIR, and Olivetti PG-108/208 printers
Pacific 4 Memory Upgradeable Memory Board	0, 1, 2, or 4 MB of laser printer memory	Fully user upgradeable, lifetime warranty, low cost	HP LaserJet IIP, III, and IIID printers
Pacific T Memory Upgradeable Memory Board	2 or 4 MB of laser printer memory	Fully user upgradeable, lifetime warranty, low cost	TEC engine laser printers including Epson EPL 6000
LP Memory Upgradeable Memory Board	1, 2, or 3.5 MB of laser printer memory	Fully user upgradeable, lifetime warranty, low cost	IBM LaserPrinter 4019 and 4019E

Connectivity Products

Pacific Connect	Printer sharing device	Low cost, share laser printer with up to 5 PC and/or 4 Macintosh users	HP LaserJet Series II, IID, III, IIID printers, IBM and Macintosh computers
PacificPrint	Printer sharing software for Novell networks	Simplifies networking printing, allows use of PDP emulation cartridges on the network	Novell NetWare—2.1 or higher; NetWare 386—3.0 or higher; NetWare ELS II

PACIFIC
DATA PRODUCTS

9125 Rehco Road • San Diego, CA 92121
(619) 597-4657 • FAX (619) 552-0889

European Sales Offices

The Netherlands • DCA Burgemeester Jaspelslaan 45
1181 NB Amstelveen, The Netherlands
Tel: (31) 20 475566 FAX: (31) 20 475529
France • DCA 91 rue du Faubourg Saint-Honore
75008 Paris, France Tel: (33) 1 47 66 75 FAX: (33) 1 42 66 116
England • DCA Ltd 1 Haringway Place, 2nd Floor, Mark Road
Hemel Hempstead, Hertfordshire, HX1 2SW, England
Tel: 44 442 31414 FAX: 44 442 316540
Switzerland • DCA Air Center Bandonnet
1214 Yverme, Geneva, Switzerland
Tel: 41 22 412650 FAX: 41 22 41 681

European Technical Support

Switzerland • DCA Air Center Bandonnet,
114 Yverme, Geneva, Switzerland
Tel: 41 22 412650 FAX: (41) 22 413682

European Production and Distribution

Ireland • D I Shannon Industrial Estate
Shannon, County Clare, Ireland
Tel: (353) 61 31 696 FAX: (353) 61 360466

Apple, PostScript, LaserJet, and LaserJet II are registered trademarks of Apple Computer, Inc. in the U.S. and other countries. PacificPage, PacificPage P•E, PacificPage XL, PacificPage XL for Macintosh, Plotter in a Cartridge, Plotter in a Cartridge P•E, The Complete Font Library Cartridge, PacificType, 25 in One! III, 25 in One! for IBM, Headlines in a Cartridge, 1-2-4 Plus Upgradeable Memory Board, Pacific 4 Memory Upgradeable Memory Board, Pacific T Memory Upgradeable Memory Board, LP Memory Upgradeable Memory Board, Pacific Connect, PacificPrint, European Sales Offices, European Technical Support, European Production and Distribution, and Ireland are trademarks of Pacific Data Products, Inc. in the U.S. and other countries. IBM, LaserJet, and LaserJet II are trademarks of International Business Machines Corporation. Olivetti is a registered trademark of Olivetti. Canon is a registered trademark of Canon. TEC is a registered trademark of TEC. Epson is a registered trademark of Epson. All other names and product names are trademarks or registered trademarks of their respective owners. © 1987 Pacific Data Products, Inc.



GRAPHICS

PRESENTATION GRAPHICS

preview, it will be worth the wait. If you've already made the move to OS/2, *Freelance Graphics for OS/2* is a worthwhile way to spend your software dollars.

Freelance Plus

by Kellyn S. Betts

In the fast-paced world of PCs, things change so quickly that a two-year-old product is almost archaic. In comparison with newer competitors, *Freelance Plus* definitely seems so; yet despite its venerable age, the \$495 package still has some superior features.

Before we go any further, it's only fair to state that by the time this review appears, a planned replacement that incorporates several competitive fixes and some fancy new features (see the sidebar "Preview of Coming Attractions") should be on the market. *PC Magazine* doesn't review products that aren't in production, however, so we're reassessing Version 3.01 of *Freelance Plus*.

A MISS ON MANAGEMENT

The years have made *Freelance*'s already weak presentation management features look even more like afterthoughts and patches. Portfolio, the menu-accessible feature that serves this role, provides little more than a means to group the files in a presentation so they can be viewed sequentially or batch printed; you still have to remember the names of the files you're grouping. And neither saving background information as a symbol nor copying one slide into another is an adequate substitute for a

master slide template.

Time has not been kind to *Freelance*'s initially awkward menu system, either. There are a huge number of options in this program. You can easily get lost in their hierarchical presentation, and the only way out is through what can be a long series of quits. Also, the lack of full mouse support requires a lot of mouse-keyboard coordination, especially when you're using drawing tools.

This is not to say that *Freelance*'s full set of features is in any way inaccessible or unusable; in fact, once you are familiar with the menus, you can whip through them quite quickly. And the richness of the features set can make the educational effort worthwhile.

STRONG DATA HANDLING

Data file importing and charting is the area where *Freelance*'s strengths far outweigh its limitations. It imports the most popular data formats, and spreadsheet-based data can be easily accessed by the program's data-linking capabilities no matter where it happens to lie in the worksheet. *Freelance* handles named ranges with aplomb and in general makes plucking the information from a spreadsheet for inclusion in a graph quite simple. Although its graph component limitations are rather miserly for live linking—notably, eight series of bars for a bar chart—it can import substantially more components elegantly through its nonlinked import facility.

The program creates a reasonable selection of variations on all the basic charts and includes a few technical options like



Freelance Plus's drawing tools give you a wide variety of image manipulation options. But its on-screen representations are weak.

FACT FILE

Freelance Plus,
Version 3.01
Lotus
Development
Corp., 55
Cambridge
Pkwy., Cambridge, MA 02142; 617-577-8500.
List Price: \$495
Requires: 640K RAM, hard disk, graphics
adapter, DOS 3.1 or later.
In Short: Despite its outdated interface and
poor on-screen font support, *Freelance Plus* is
still one of the most robust charting packages
on the market. An imminent upgrade should
repair most of its deficiencies.



CIRCLE 406 ON READER SERVICE CARD

logarithmic scaling and regression analysis as well. And once their data is designated, charts made in *Freelance* can be manipulated and embellished with the program's drawing tools.

The drawing tools are another of *Freelance*'s strengths: You get a comparatively full set of image editing, image manipulation, and workspace control features. You must make a large number of menu picks and confirmatory key-presses to use these features, but they supply what you need to create usable images, even without a mouse. It's a nice touch in a DOS program, particularly if you can't find what you want among its over-900 editable clip-art images or in any of the importable CGM and Lotus .PIC images available. (*Freelance* can also export CGM files.)

Working with the program's drawing tools is hampered by its inability to offer a completely WYSIWYG display, however. When you're drawing, you're limited to the 12 colors in the program's palette, and what you specify as black is always displayed as white and vice versa, which can be confusing. You can specify more hues if your intended output device is one that supports more colors, but you must work with the basic 12 when drawing. All text is displayed in a single typeface that resembles a dot matrix printer's draft mode.

TROUBLE WITH TEXT

Freelance's general handling of text is severely in need of improvement. It provides fill-in-the-blank forms that should make the entry of text charts such as bulleted lists and tables a snap. Unfortunately, the forms don't support word wrap,

GRAPHICS

PRESENTATION GRAPHICS



PRESENTATION GRAPHICS SOFTWARE: SUMMARY OF FEATURES

Products listed in ascending price order

	CA-Cricket Presents	Pixie	Applause II	Charisma	DrawPerfect	Freelance Plus
	\$199	\$295	\$495	\$495	\$495	\$495
GENERAL						
Interface	Windows	Windows	DOS graphics	Windows	DOS graphics	DOS character/graphics DOS only
Memory support	Windows 3.0	Windows 2.x, 3.0	LIM 4.0 EMS	Windows 2.x, 3.0	LIM 4.0 EMS	
Overflow to disk	☐	☒	☐	☐	☒	☐
Networks supported	NetBIOS, Novell	NetBIOS, Novell	NetBIOS, Novell	NetBIOS, Novell	NetBIOS, Novell, Banyan	Novell, Banyan
Run from server	☒	☒	☒	☒	☒	☒
File sharing/locking	☐	☒	☒	☐	☒	☒
Math coprocessor supported	☒	☒	☐	☒	☐	☒
WORD CHARTING AND TEXT HANDLING						
Word-charting functions:						
Bullet lists	☒	☒	☒	☒	☒	☒
Numbered lists	☐	☐	☐	☐	☐	☐
Multicolumn tables	☒	☒	☒	☒	☐	☒
Maximum rows, columns	Unlimited	Unlimited	5, 4	Unlimited	N/A	8, 30
Word-wrap text boxes	☒	☒	☒	☐	☒	☐
Font support:						
Scalable fonts supplied	12	13	2	13	17	4
Vendor of supplied fonts	Nimbus Q	Bitstream	Bitstream	Bitstream, URW	Proprietary	Bitstream
Range of type sizes (points)	6-unlimited	Unlimited	1-99% of work area	1-72	1-499	1-100
Printer font support:						
HP cartridge/soft fonts	☐ / ☐	☒ / ☒	☐ / ☐	☒ / ☒	☐ / ☐	☐ / ☐
PostScript	☐	☒	☐	☒	☐	☒
Text alignment and style options:						
Aligns text on baseline	☒	☐	☒	☐	☒	☒
Indents text	☒	☒	☐	☒	☒	☒
Full justification	☒	☐	☐	☐	☐	☐
Sets text margins	☒	☒	☐	☒	☒	☐
Shrinks text to fit box	☐	☒	☒	☐	☐	☐
Expands box to fit text	☐	☒	☒	☐	☐	☐
Rotates text	☐	☒	☒	☒	☒	☒
Adjusts leading	☒	☐	☒	☒	☐	☐
Adjusts kerning	☒	☐	☐	☐	☐	☐
Spell-checker	☐	☒	☒	☐	☒	☐
BUSINESS CHARTS						
Chart gallery	☐	☒	☒	☒	☐	☐
Chart style sheets	☒	☒	☒	☒	☐	☐
Bar charts (horizontal/vertical):						
Plain	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒
Stacked	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒
Overlapped	☐ / ☐	☐ / ☐	☒ / ☒	☒ / ☒	☒ / ☒	☐ / ☐
Clustered	☐ / ☐	☐ / ☐	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒
Shadowed 3-D	☐ / ☐	☒ / ☒	☐ / ☐	☒ / ☒	☐ / ☐	☐ / ☐
Projected 3-D	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒
True 3-D bar chart	☐	☐	☐	☐	☐	☐
Histogram	☐	☐	☒	☐	☐	☐
Maximum bars per chart	20	Unlimited	600	Unlimited	Unlimited	560
Pie charts:						
2-dimensional	☒	☒	☒	☒	☒	☒
3-dimensional	☒	☒	☒	☒	☒	☒
Specify 3-D viewing angle	☐	☒	☒	☒	☐	☒
Specify 3-D pie thickness	☐	☒	☒	☒	☐	☒
Maximum number of slices	20	Unlimited	16	Unlimited	12	16
Exploded slices	☐	☒	☒	☒	☒	☒
Yank and place	N/A	☒	☐	☒	☐	☒

☒—Editors' Choice ☒—Yes ☐—No

N/A—Not applicable: The product does not have this feature.

The body of The heart and

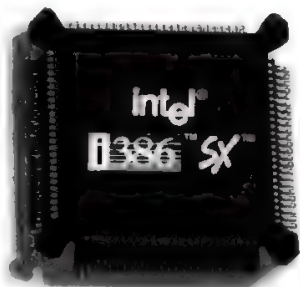


a laptop. soul of a PS/2.

INTRODUCING A PS/2 LAPTOP THAT'S FULL OF FEATURES. NOT COMPROMISES.

Making a computer light enough to take anywhere and small enough to sit on a lap isn't enough. Making it perform like one that sits on a desk is the true challenge. That's why IBM has created a computer that delivers true portability without sacrificing true performance—the Personal System/2[®] Laptop 40 SX. At just 7.7 pounds it's clearly a lightweight computer. But it certainly doesn't act like one.

DESKTOP PERFORMANCE, WITHOUT THE DESK.



The PS/2[®] Laptop looks great from the outside. But its true beauty lies inside, where you'll find uncompromised computing power. It has the same 386SX[™]/20 MHz processor found in best-selling desktop models. A 3.5" 1.44MB disk drive and 2.5" 60MB

fixed disk provide fast access to programs and data, and standard 2MB RAM is expandable to 18MB.

Instead of compromising comfort by altering the keyboard, the PS/2 Laptop has a full-size keyboard spaced and arranged the same way as a desktop PS/2's. And instead of squeezing information onto a pint-size screen, it has a sidelit LCD that offers a 10"-diagonal viewing area. It delivers sharp, clear text and graphics with VGA quality in 32 shades of gray. With so much to offer, the PS/2 Laptop succeeds at being small, without being small-minded.

THE PS/2 LAPTOP IS ONE LAPTOP NOT TO BE TAKEN LIGHTLY.

IBM knows it's not how small you make it—it's how you make it small. The PS/2 Laptop has system status icons that monitor assorted functions and battery life. Extensive power management controls include the ability to change batteries in the



IBM PS/2 LAPTOP 40 SX	
FEATURES	
MICROPROCESSOR	80386SX With Suspend/Resume
Standard	20 MHz
Clock Speed	
MEMORY	2MB
Standard	18MB
Maximum	
STORAGE	3.5" 1.44MB Diskette Drive
Standard Diskette Drive	2.5" 60MB Fixed Disk
Standard Hard Drive	
PACKAGING	21" (M) x 12.8" (W) x 10.7" (D)
Dimensions	7.7 Lbs. W/Battery
Weight	
POWER	Up to 3 Hours; W/ Non-Disruptive Exchange;
Battery	W/ Battery Status Indicator
KEYBOARD	101 Keys (W/Numeric Keypad); 5 Degree Slant;
	Standard Key Spacing
DISPLAY	LCD/Sidelit; VGA/32 Gray Scale
OPTIONS	Data/Fax Modem; Trackpoint (Mouse/Track Ball);
	Quick Charger

middle of an application without exiting and a special feature that suspends power when the screen is closed, then returns to full power when reopened, resuming applications where they were left off without the need to save to the hard drive.

Of course, it comes with an AC adapter, and a 2400 BPS Data Modem/9600 BPS Fax Modem is available, as well as a special mouse that doubles as a trackball when turned over. And the PS/2 Laptop comes with something no laptop should be without—an international warranty* backed by thousands of Authorized Remarketers worldwide, so service and support are never far away.

To find out more, contact your IBM Authorized Remarketer or IBM marketing representative. You'll see why with the new PS/2 Laptop, you don't need a whole lot of room to get a whole lot of computer.

How're you
going to do it?
PS/2 it!



GRAPHICS PRESENTATION GRAPHICS



PRESENTATION GRAPHICS SOFTWARE: SUMMARY OF FEATURES

Products listed in ascending price order

	CA-Cricket Presents	Pixie	Applause II	Charisma	DrawPerfect	Freelance Plus
BUSINESS CHARTS (continued)						
Multiple linked pies	☐	☐	☐	☒	☐	☐
Proportional pies	☐	☐	☐	☐	☒	☐
Line and scatter plots:						
Line chart (discrete scale)	☐	☐	☒	☒	☐	☒
x,y chart (continuous scale)	☒	☒	☒	☒	☒	☒
Scatter chart (points)	☒	☒	☒	☒	☒	☒
Point symbols	16	5	8	10	9	225
Line styles	5	8	7	5	15	8
Area charts:						
Unstacked area chart	☒	☒	☒	☒	☒	☒
Cumulative area chart	☒	☒	☒	☒	☐	☒
Stacked area chart	☒	☒	☒	☒	☒	☒
Combination charts:						
Line over bar	☐	☒	☒	☒	☒	☒
Line over area	☐	☐	☒	☒	☒	☒
Hi-lo over bar	☐	☐	☐	☒	☒	☒
Overlays in any combination	☐	☒	☐	☒	☒	☒
Miscellaneous charts:						
Hi-lo-open-close	☐	☐	☒	☒	☒	☒
Flowchart	☐	☐	☐	☐	☐	☐
Organization chart	☐	☐	☒	☒	☐	☐
Gantt chart	☐	☐	☐	☐	☐	☐
Pictograph	☐	☐	☒	☐	☒	☐
Map chart	☐	☐	☒	☐	☐	☐
TECHNICAL CHARTING FEATURES						
Technical scaling options:						
Semi-log / log-log scales	☐ / ☐	☐ / ☐	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒
Double x-axis/double y-axis	☐ / ☐	☐ / ☒	☐ / ☒	☐ / ☐	☐ / ☒	☐ / ☒
Curve fitting	☐	☐	☒	☒	☒	☐
Error bars	☐	☒	☐	☐	☐	☐
Scientific symbols/Greek letters	☒ / ☐	☒ / ☒	☒ / ☒	☒ / ☒	☒ / ☒	☐ / ☐
DATA-HANDLING FEATURES						
Imports data formats:						
ASCII (comma-delimited)	☐	☐	☒	☒	☒	☒
ASCII (fixed field)	☐	☒	☒	☐	☒	☒
ASCII (tab-delimited)	☒	☐	☒	☐	☒	☒
ASCII (print image)	☐	☐	☒	☒	☐	☐
.WK1 (Lotus worksheet)	☒	☒	☒	☒	☒	☒
.DBF (dBASE)	☐	☐	☒	☐	☐	☒
.DIF (Lotus)	☒	☐	☒	☐	☐	☐
SYLK	☒	☐	☒	☒	☐	☒
Maximums:						
Data points per series	20	Limited by RAM	600	16,384	8,000	500
Data series per chart	4	Limited by RAM	10	16,384	12	18
Data points per chart	80	Limited by RAM	6,000	4.2 million	96,000	2,000
Data handling:						
Imports named range	☐	☒	☐	☐	☒	☒
Preserves named range	☐	☐	☐	☐	☒	☐
Selects noncontiguous data	☐	☐	☐	☐	☐	☐
Ignores blank rows/columns	☐	☐	☐	☒	☐	☐
Rearranges columns/rows	☐	☐	☐	☐	☒	☒
Math functions in data sheet	☐	☐	☒	☐	☒	☐
Data transformation by function	☐	☒	☐	☒	☐	☐
Chart linked to external worksheet	☐	☒	☐	☐	☒	☒
DDE paste or embedded links	☐	☒	☐	☒	☐	☐

☒—Editors' Choice ☒—Yes ☐—No

N/A—Not applicable: The product does not have this feature.

GRAPHICS PRESENTATION GRAPHICS



PRESENTATION GRAPHICS SOFTWARE: SUMMARY OF FEATURES

Products listed in ascending price order

	CA-Cricket Presents	Pixie	Applause II	Charisma	DrawPerfect	Freelance Plus
CHART EDITING AND FORMATTING						
Places/moves/edits interactively:						
Chart	☒	☒	☒	☒	☒	☒
Chart elements	☒	☒	☒	☒	☒	☐
Automatically scales chart to fit	☐	☒	☒	☐	☒	☐
Rotates chart	☐	☐	☒	☒	☒	☐
Chart options:						
Shows grid	☒	☒	☒	☒	☒	☒
Multiple charts per slide	☒	☒	☒	☒	☒	☒
Multiline titles	☒	☒	☒	☒	☐	☒
Multiline axis labels	☒	☒	☐	☐	☐	☒
Multicolumn legends	☐	☒	☐	☒	☐	☒
Data labels	☒	☒	☒	☒	☒	☒
Automatic time-series labeling	☐	☒	☒	☐	☒	☒
Picks up labels from worksheet	☐	☒	☒	☒	☐	☒
Fill patterns and colors:						
Total fill patterns	12	1	20	38	64	15
Maximum fill patterns per chart	12	1	10	38	64	15
Total colors in palette	16.7 million	98	3.6 million	16.7 million	256	12
Maximum colors per chart	256	98	3.6 million	16.7 million	256	12
Selects fills by name or number	☐	☐	☐	☐	☒	☒
Picks fills from palette box	☒	☒	☒	☒	☒	☐
User-definable palettes	☒	☒	☒	☒	☐	☒
Can apply global color scheme	☐	☒	☐	☐	☐	☐
Gradient fills:						
Can apply to slide backgrounds	☒	☒	☒	☒	☒	☐
Can apply to objects	☐	☒	☒	☒	☐	☐
Horizontal	☐	☐	☒	☒	☒	☐
Vertical	☒	☒	☐	☒	☐	☐
Angled fills	☐	☐	☐	☒	☐	☐
User-selectable angle	☐	☐	☐	☒	☐	☐
Radial fills	☐	☐	☐	☒	☐	☐
ANNOTATION FEATURES						
Text annotation:						
Lines of text	☒	☒	☒	☒	☒	☒
Word-wrap box	☒	☒	☒	☐	☒	☐
Shadowed box	☐	☐	☐	☐	☐	☒
Drawing tools:						
Line	☒	☒	☒	☒	☒	☒
Box	☒	☒	☒	☒	☒	☒
Rounded box	☒	☒	☐	☒	☒	☐
Arc	☒	☐	☒	☒	☒	☐
Circle or ellipse	☒	☒	☒	☒	☒	☒
Freehand curves	☐	☐	☒	☒	☒	☐
Pixel editing	☐	☐	☐	☐	☐	☒
Line styles:						
Line widths	5	4	7	Variable	16	5
Line end styles	5	1	3	22	1	8
Arrowhead styles	5	1	1	9	1	1
Image manipulation tools:						
Align to baseline	☐	☐	☒	☒	☒	☒
Break objects apart	☒	☐	☒	☒	☒	☒
Cut/copy/paste objects	☒	☒	☒	☒	☒	☒
Duplicate objects	☒	☒	☒	☒	☒	☒

Editors' Choice ☒—Yes ☐—No

The power planner the competition didn't plan on.

Announcing Project Scheduler™ 5.
The difference is still graphically clear.

Impressive new features and a highly intuitive graphic interface make Project Scheduler 5 the easy-to-use project management software the competition just can't beat. Why? Because critical project information is easier to understand — and instantly available — at every level of detail.



Key milestones of your choice, such as completion dates, checkpoints on progress, and major accomplishments, are summarized across the top of your schedule for an instant overview of project status.

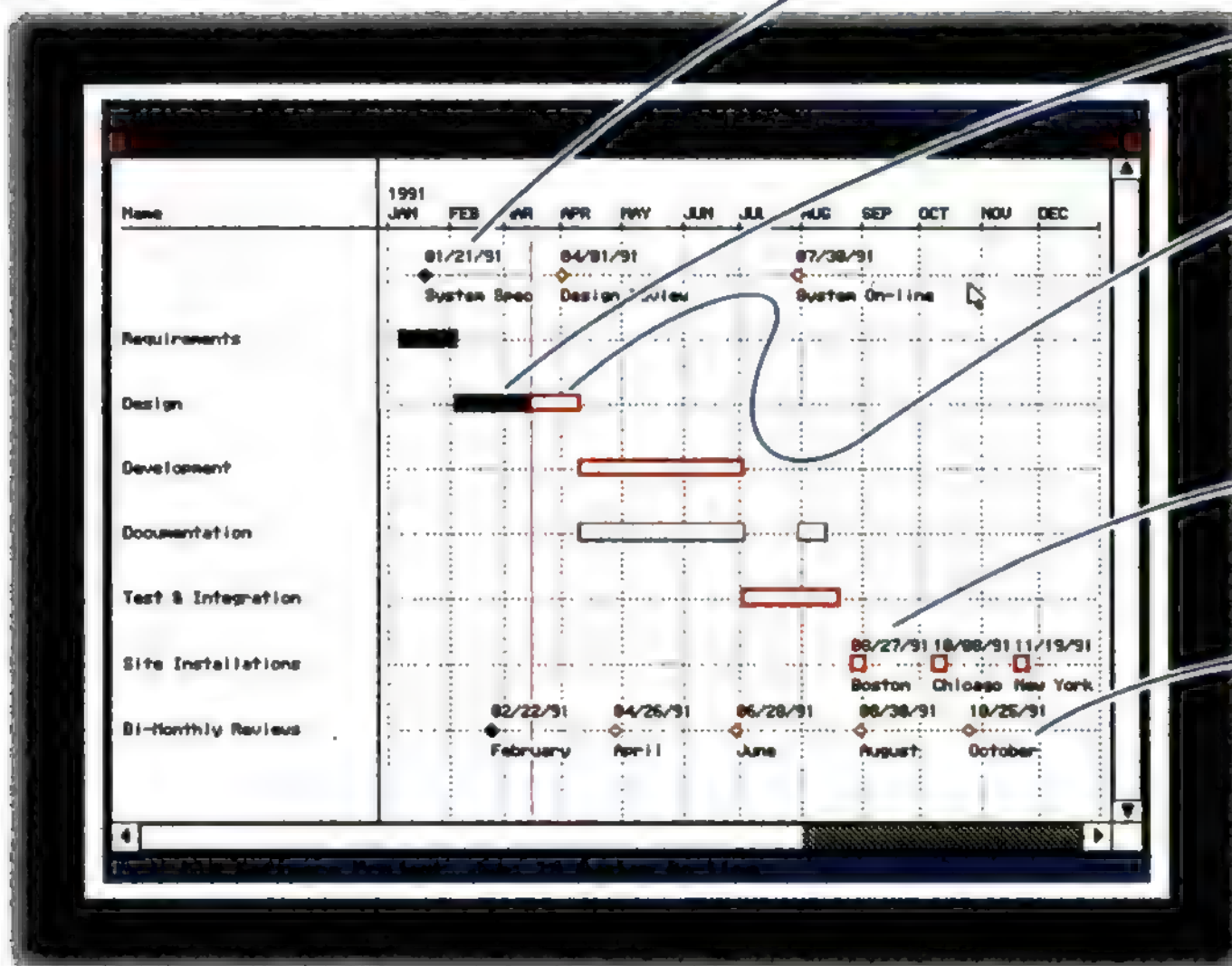
Gantt chart shows you more of what you want to see.

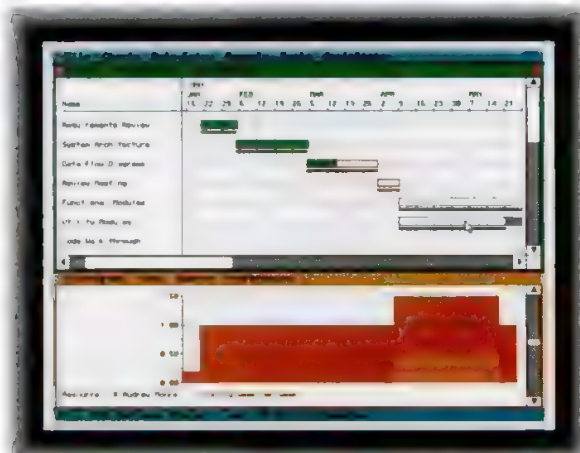
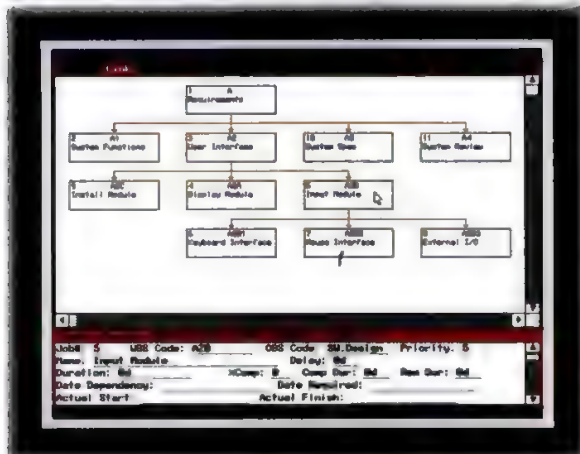
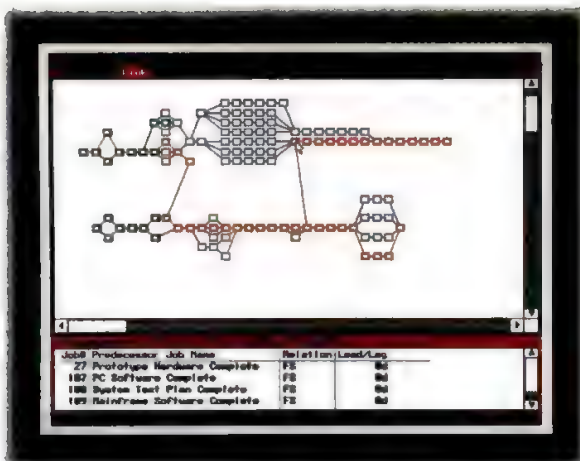
Shaded areas illustrate "percent complete" for each job.

The critical path is always clearly visible, indicated by a heavy red outline.

You can annotate your chart with information such as when and where an event takes place, even at summary levels.

Information can be categorized and labeled — all on the same line — maximizing vertical screen space and helping you create tighter, crisper presentations.





● **Flexible zoom options (top).** Project Scheduler 5's network diagram gives you an easy-to-read overview of dependencies at five selectable zoom levels. It also lets you define links across projects within and across work groups.

● **Organizational tree structures (middle).** Tree structures let you easily organize your project by both Work Breakdown Structure (WBS) and Organization Breakdown Structure (OBS) codes. This dual organization capability lets you tailor the structure and reporting of your project to fit your unique needs. You can create codes from your tree, or create the tree from your codes — whichever is more convenient.

● **Interactive and automatic resource leveling (bottom).** By leveling resources interactively using a resource-filtered Gantt with the resource histogram in the lower window, you can quickly pinpoint overloads and make adjustments. With automatic resource leveling, the schedule is adjusted to fit within specified availability limits for each resource.

Feature	Project Scheduler 5	Microsoft* Project for Windows*	Time Line* 4.0
Project planning and tracking	•	•	•
Gantt and network charts	•	•	•
Work group project connectivity	•		
Tree structures	•		•
Staffing profiles	•		
Cost curves	•		
Cost inflation modeling	•		
True PERT analysis	•		
Batch reporting facility	•		
Graphical user interface	•	•	

Integrated work group project connectivity.

With Project Scheduler 5, work group project connectivity is no longer just an idea. Because now you can accurately define dependencies among independent project files. Projects can be viewed at the individual or group level. Full data integrity is maintained because all schedule commitments are generated from an integrated validated group-level network.

The features you really need.

Convenience features such as WBS and OBS tree charts viewed with selectable zoom levels make organizing and presenting project information a breeze. Annotated Gantt charts let you see more information on screen at the same time, and produce more concise presentations. Financial cost curves plot anticipated costs versus actual costs to date. And a new batch reporting facility makes periodic report generation fully automatic.

Results you can clearly see.

Best of all, Project Scheduler 5 charts and reports contain precisely the information you need — summarized at a higher level for executives and board members, or selectively summarized and filtered to highlight individual project parts.

With Project Scheduler 5, planning your projects has never been easier. For more information and a brochure, call or write:

415/570-7700
393 Vintage Park Drive
Suite 140
Foster City, CA 94404

*Third-party trademark



Scitor
Corporation

GRAPHICS PRESENTATION GRAPHICS



PRESENTATION GRAPHICS SOFTWARE: SUMMARY OF FEATURES

Products listed in ascending price order

	CA-Cricket Presents	Pixie	Applause II	Charisma	DrawPerfect	Freelance Plus
ANNOTATION FEATURES (continued)						
Flip objects	☐	☐	☒	☒	☒	☒
Group/ungroup objects	☒	☐	☒	☒	☒	☒
Move objects to front/back	☒	☒	☒	☒	☒	☒
Resize objects	☒	☒	☒	☒	☒	☒
Rotate objects	☐	☒	☒	☒	☒	☒
Workspace control tools:						
Pan	☒	☒	☐	☐	☒	☒
Zoom	☒	☒	☒	☒	☒	☒
Fixed increments	☒	☒	☐	☐	☒	☒
Incremental (marquee box)	☐	☐	☒	☒	☒	☒
Manual redraw	☐	☐	☒	☒	☒	☒
Work with multiple visuals	☒	☐	☒	☒	☐	☒
Keystroke macros	☐	☐	☐	☒	☒	☐
Script language	☐	☐	☐	☐	☒	☐
Vector file import formats:						
CGM	☒	☒	☒	☒	☒	☒
.DXF (AutoCAD)	☐	☐	☐	☒	☒	☐
EPS (.AI format)	☒	☐	☐	☐	☒	☐
.GEM (GEM vector)	☐	☐	☐	☒	☒	☐
HPGL	☐	☐	☐	☐	☒	☐
Lotus .PIC	☐	☒	☐	☐	☒	☒
.WMF (Windows Metafile)	☒	☐	☐	☒	☐	☐
Bitmap file import formats:						
.BMP (Windows Bitmap)	☐	☐	☐	☐	☐	☐
.IMG (GEM)	☐	☐	☐	☐	☒	☐
.PCX	☒	☐	☒	☒	☒	☐
.TGA (Targa)	☐	☐	☐	☐	☐	☐
TIFF	☒	☐	☒	☒	☒	☒
Clip art images included	70	103	400	2,200	500	900
More available at extra cost	☐	☒	☐	☒	☒	☒
Paper catalog	☒	☐	☒	☒	☒	☒
Software catalog	☒	☐	☐	☒	☐	☐

PRESENTATION FEATURES						
Common background						
Multiple backgrounds per presentation	☐	☐	☒	☒	☒	☒
Suppresses background for slide	☐	☐	☒	☐	☐	☒
Slide templates						
Multiple templates per presentation	☒	☒	☐	☒	☒	☒
Multiple templates per slide	☒	☐	☐	☐	☐	☒
Presentation management:						
Saves presentation list in file	☒	☒	☒	☐	☒	☒
Title sorter	☒	☐	☒	☐	☒	☒
Slide sorter	☒	☐	☐	☐	☐	☐
Cuts/pastes slides to clipboard	☒	☒	☐	☒	☒	☐
Outliner	☒ (separate)	☐	☐	☐	☐	☐
Imports ASCII outlines	☒	☐	☐	☐	☐	☐
Speaker's notes	☒	☐	☐	☐	☐	☐
Screen shows						
Transition effects	13	None	25	17	15	14
Overlay images	☐	☐	☒	☐	☒	☐
Standalone runtimes	☐	☐	☒	☐	☒	☒

☒—Editors' Choice ☒—Yes ☐—No
 N/A—Not applicable: The product does not have this feature.

GRAPHICS PRESENTATION GRAPHICS

Harvard Graphics	Kinetic Words, Graphs & Art	PC Microsoft PowerPoint	Presentation Team	35mm Express	Graphics for OS/2	Presentation Express	ImageStation
------------------	-----------------------------	-------------------------	-------------------	--------------	-------------------	----------------------	--------------

☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒	☒	☒	☒
☒	☒	☐	☒	☒			

GRAPHICS

PRESENTATION GRAPHICS



PRESENTATION GRAPHICS SOFTWARE: SUMMARY OF FEATURES

Products listed in ascending price order.

	CA-Cricket Presents	Pixie	Applause II	Charisma	DrawPerfect	Freelance Plus
OUTPUT SUPPORT						
Output options:						
Maximum slides per page	8	1	Unlimited	30	1	Unlimited
Background printing	■	■	□	■	■	□
Draft mode (low-resolution)	■	□	■	■	■	■
Color-to-monochrome printing:						
Colors to gray scales	■	■	■	■	■	■
Colors to fills	■	□	□	□	■	■
Inverts text/background colors	□	□	■	□	■	□
Applies monochrome color scheme	□	■	■	■	■	□
Monochrome output devices:						
Epson dot matrix	■	■	■	■	■	■
Hewlett-Packard LaserJet	■	■	■	■	■	■
Hewlett-Packard DeskJet	■	■	■	■	■	■
PostScript	■	■	■	■	■	■
Color output devices:						
Hewlett-Packard PaintJet	■	■	■	■	■	■
Color PostScript	■	■	■	■	■	■
Hewlett-Packard plotters	■	■	■	■	■	■
Film recorders:						
Agfa (Matrix)	■	■	■	■	■	■
Polaroid Palette	■	■	■	■	■	■
PTI Montage	■	■	■	■	□	□
Custom slide service link	■	□	■	■	■	■
Service bureaus	Autographix	N/A	MagiCorp	MagiCorp, Slidemasters	MagiCorp	Autographix, MagiCorp
Communications software included	■	N/A	■	■	□	□
Graphics file export:						
CGM	■	■	■	■	■	■
.DXF	□	□	□	■	□	□
EPS	□	□	■	■	■	■
Editable EPS (.AI format)	□	□	■	□	□	□
EPS with TIFF header	□	□	□	■	□	□
.GEM (GEM vector)	□	□	□	■	□	□
HPGL	□	□	■	■	■	■
.PCX	□	□	□	■	■	□
PICT (MacDraw)	□	□	□	■	□	□
SCODL	□	■	■	■	■	□
TGA (Targa)	□	□	□	□	□	□
TIFF	□	□	□	■	□	□
WMF (Windows Metafile)	■	■	□	■	□	□
SCREEN DISPLAY						
High-resolution drivers:						
Super VGA (800 by 600)	■	■	■	■	■	□
Extended VGA (1,024 by 768)	■	■	□	■	■	□
IBM 8514/A	■	■	■	■	■	□
TGA	■	■	□	■	■	□
Maximum on-screen colors:						
Undithered	256	16	16	16	256	12
With dithering	16.7 million	98	5,000	256	256	12
DOCUMENTATION						
Tutorial manual	■	■	■	■	■	■
Sample files included	■	■	■	■	■	■
On-line help	■	■	■	■	■	■

■—Editors' Choice ■—Yes □—No

N/A—Not applicable: The product does not have this feature.

GRAPHICS PRESENTATION GRAPHICS

Suitability to Task

Freelance Plus

	Word charts	☐	☒	☐	☐
	Data charts	☐	☐	☐	☒
	Pictures and diagrams	☐	☒	☐	☐
	Technical charts	☒	☐	☐	☐
	Business presentations	☐	☒	☐	☐

and editing is more difficult than it should be because of the program's dependence on the Arrow keys and the Spacebar to traverse menus. And you'll have to place bullets by hand.

Freelance's monstrous manual warns users to try to choose their output devices *before* creating files, and you should heed this advice. I initially created my test charts for the Matrix MVP driver because it allowed me to specify a color background and supported more colors. The text I specified printed properly on laser printers, but graphics were a different story. The Laserwriter driver does a fine job of mapping colors to gray scales, but the Hewlett-Packard LaserJet has a tough time: Not only did the colors mapped to gray scales and the fill mapping have to be respecified without viewing the original colors, but priority information was lost. A color CGM file the program imported had to be completely redrawn with new fills for LaserJet output. (Lotus does have a LaserJet III driver, however, that dramatically improves gray-scale output.)

Help for *Freelance* is on its way, and it's sure to make this a much better product than the version we reviewed. Still, a look at its strengths shows what you can expect from the new program: There's still a lot of life left in it.

Harvard Graphics

by Carol Levin

For two consecutive years, *Harvard Graphics* (\$495) was our Editors' Choice presentation package. Though at the time of our last evaluation it was beginning to show its age, it's still an easy-to-use package offering a balanced approach. *Har-*

vard Graphics is estimated to hold almost 60 percent of the market share, and Software Publishing has made good on its promise of an overhaul. But the question remains, has *Harvard Graphics* gained an edge on its competition?

Version 2.3 certainly does offer some significant new features, including HyperShow, a powerful screen show utility that lets you branch from a single slide to up to ten others by pressing carefully camouflaged on-screen buttons. Click on a pie chart slice, for instance, and you go directly to a slide detailing the numbers behind that slice; click on a map of your sales regions, and you go right to the sales figures for those regions.

Version 2.3 supports direct links to named ranges in spreadsheets, accessible via speed keys. It also recognizes a greater number of file formats—*Excel* as well as *Lotus 1-2-3* and ASCII—and imports *Lotus .PIC* vector images, as well as CGM, HPGL, and EPS graphics files. Output improvements include support for the printer-based scalable fonts built into the HP LaserJet III and for color- to gray-scale conversion. Its predecessor's unimpressive clip-art library has been replaced with a new 500-image library, and ready-made animation overlays simulate a dartboard, cash register, hourglass, and other effects.

UNIFICATION GOALS

Criticized in the past as a patched program, *Harvard Graphics* is now considerably more unified, with better drawing and charting functions. Version 2.3 incorporates several features that were formerly available only as separately purchased

Suitability to Task

Harvard Graphics

	Word charts	☐	☒	☐	☐
	Data charts	☐	☐	☒	☐
	Pictures and diagrams	☐	☒	☐	☐
	Technical charts	☐	☒	☐	☐
	Business presentations	☐	☒	☐	☐

add-ons. A new application shell provides direct access to Draw Partner (a drawing and digitizing program of large repertoire), the Autographix Overnight Slide Service program, and five other applications of your choice. If you have expanded memory, the main program can swap itself there, surrendering 420K for use by the add-on applications.

For users who don't want to waste time building graphs and charts from scratch, the Chart Gallery makes it easy to design a chart quickly. Just click on one of the 65 on-screen thumbnails, enter the data, choose your corporate colors from 12 preset color palettes, and voilà! If you prefer a more creative approach to designing a presentation, though, *Harvard Graphics* takes considerably more effort. To make even a simple font change on some charts, for instance, you must save the chart as a Symbol, create a new Free Form chart, go to the Draw/Annotate screen, add it as a symbol, and then ungroup it to convert the text into an editable Object before you can finally select one



Harvard Graphics' most notable new feature is its HyperShow utility, which lets you create interactive PC-based presentations. You can use up to 20 clickable buttons per chart, which can select any other slide in the presentation.

**“THE MOST
POWERFUL
COMPUTERS
ARE THE
ONES PEOPLE
ACTUALLY
USE.”**

—Apple Computer

First off, let's get one thing straight.
We totally agree with Apple.*
A truly powerful computer is measured in how often it's used.

IF YOU LISTEN TO APPLE, THIS IS THE MOST POWERFUL COMPUTER IN THE WORLD.

But while Apple has taken great strides in making the personal computer more useful, we've gone substantially farther.

Introducing the T2000SX notebook computer.

Quite simply, the T2000 SX is a more useful personal computer because it allows you to work how you want to work. When you want to work. And where you want to work.

Painstakingly engineered with you clearly in mind, the T2000SX will help you work more efficiently than ever before.

Virtually every feature you can find on a desktop computer, you will



Our technologically superior battery can be fully recharged in a mere ninety minutes.
find on the T2000SX: An 80386™ SX processor with a math coprocessor socket, VGA compatible display, 1 MB (expandable to 9MB) of 70 nsec RAM, a 40 MB hard disk with 19 msec access time and 1.5 MB/sec data transfer rate.



The T2000SX has a 40MB hard disk with 19 msec access time.

But more important than the specs themselves, is the way the T2000SX lets you use them. Which is more often.

Our fluorescent side-lit screen provides even distribution of light. (Actual size.)

Welcome to the next generation in personal computing.

Because the T2000SX can fit easily into a briefcase (it weighs a scant 6.9 pounds), you can take it anywhere you go and use it in more ways than you can imagine.

Need to make revisions to a



Our internal AutoResume back up battery automatically saves your work if your main battery runs out.

business proposal? The T2000SX gives you the freedom to do it from a train. The client wants an estimate on costs? You can give it to him right then and there—wherever there is.

No more wasting time running

back to the office. Because the office is always with you.

But just in case there's something



Our user-installed memory card allows you to add up to 8 MB of memory yourself.

back at the office you still need, you can get back to it with our optional built-in modem. Which supports industry standard error correction and data compression (CCITT V.42, V.42bis, MNP® 5 and 10). It even supports cellular data communications via our optional smart cable adapter.

The T2000SX also has a unique feature you won't find on any other computer in the world. It is called AutoResume.

AutoResume: Think of it as a bookmark for your computer.

AutoResume automatically saves whatever you're working on whenever you turn the computer off. And it lets you go directly to the program you were using last when you're ready to start up again. So you don't have to reboot, restart your application and reload your files.

AutoResume



The T2000SX has an optional modem that allows data communications via a cellular phone.

also helps save on battery life and it allows you to change batteries without losing an ounce of information.

As for batteries, the T2000SX touts the latest in battery technology—Nickel Hydride. Nickel Hydride delivers 22% more watt-hours per pound than NiCad and it doesn't suffer from memory effect.

In keeping with the Toshiba tradition, the T2000SX also offers superior ergonomics. Like full-size, standard-spaced keys on a keyboard which has a full set of 12 dedicated function and 8 cursor control keys. And a VGA compatible, reversible black on white or white on black high resolution display.

Okay, let's wrap this thing up.

These are just a few of the reasons why we believe the T2000SX is the most useful, and therefore, most powerful computer in the world. And why PC Week Labs said, "the T2000SX offers performance comparable to the LTE 386s/20, plus many of the design features that have made Toshiba a market leader in portable PCs."

PC WEEK

If you'd like to learn more about the T2000SX or any of our other portable computers, call us at 1-800-457-7777.

In closing, we'd like to thank you for reading our ad.

We'd also like to thank our friends at Apple for giving us such a wonderful endorsement.

TOSHIBA

In Touch with Tomorrow.

CIRCLE 379 ON READER SERVICE CARD

GRAPHICS PRESENTATION GRAPHICS

FACT FILE

Harvard Graphics, Version 2.3
Software
Publishing Corp.
1901 Landings

Dr., P.O. Box 7210, Mountain View, CA
94043-7210; 415-962-8910.

List Price: \$495

Requires: 512K RAM, hard disk, graphics
adapter, DOS 2.1 or later.

In Short: This modular, character-based
classic, while still very usable for basic
business charts, has reached the end of the
line as a presentation package. PC-based
presenters will want to check out its
HyperShow feature, however.

CIRCLE 107 ON READER SERVICE CARD

in the Draw/Annotate mode makes designing custom charts an arm's-length process, forcing you to flip through layers of menus and screens. The package has problems with slide output, too, including poor text justification, difficulty in handling multiple fonts as text, and vertical distortion that made whole images seem stretched.

It is in Draw Partner that *Harvard Graphics* arguably suffers from vestiges of its old modular design. The accessory includes new tools for freehand drawing, arcs, wedges, skews, point editing, pan and zoom, as well as the ability to rotate and resize objects while preserving aspect ratio, but it takes about 10 seconds to load. One significant improvement is that charts are now live, so changes made to objects in Draw Partner are no longer locked-in vector files but are automatically linked to *Harvard Graphics*. Draw Partner remains an accessory, though, duplicating many of Draw/Annotate's functions and handling objects in slightly different ways, which are explained in a separate Draw Partner manual. For example, you can

labor over a detailed drawing in Draw Partner only to be warned that it's too complex to transfer back to *Harvard Graphics*. Clearly, this capable drawing tool should be integrated into the rest of the package.

Last year, we called *Harvard Graphics* a grand old building that's been enlarged too many times by too many different architects. The latest version does a few things to the facade, but it's no substitute for a full restoration: Underneath it's the same old structure. Half a million *Harvard* users will find Version 2.3 a worthwhile upgrade; others may prefer to pass it up in favor of more modern alternatives.

ImageStation

by Barry Simon

ImageStation's \$795 Super VGA version is heavily influenced by its heritage: It's the younger brother of *Yale Graphics'* \$1,795 professional-level presentation system, which uses Truevision's Targa adapter. True to its heritage, *ImageStation* offers professional-quality output, but the

IF YOU COULD DO FOR YOUR BRAIN WHAT POWER PAK V2 DOES FOR YOUR COMPUTER, YOU'D BE FINISHED READING THIS AD BY NOW.



NEW! VERSION 2

Install PC-Kwik® Power Pak on any DOS-based computer and you'll experience an immediate and dramatic acceleration of screen data, keyboard speed, disk access, and printer output. Benchmark tests show 2 to 9 times faster. And the faster the CPU, the greater the improvement.

Power Pak's integrated approach to performance-enhancement can give your computer the speed and the feel of a much faster machine. And that's only part of the story.

Now Version 2 of Power Pak provides:

- ▶ Reduced conventional memory requirements – down to 0 Kb in some cases.
- ▶ Intelligent sharing of memory with WIN3.0 and other

applications – all extended or expanded memory is used for speed yet still available for applications, automatically.

- ▶ Accelerated disk performance of WIN3.0 – see how Windows was meant to run!

Call for our free booklet "Optimizing Performance" or for a dealer near you
1-800-777-6858.



FEATURES

Super PC-Kwik version 4
The industry's #1 disk cache
Keyboard Accelerator
ReDOS™ command line editor
Print spoolers
Screen accelerator
ReView™ screen reviewer
Screen blaster
Ram disks
Disk performance analyzer
RAM-use display utility
Windows 3.0 compatible

\$129.95

Super PC-Kwik also available separately
90 Day Money Back Guarantee



Awarded to Super PC-Kwik

Multisoft Corporation
15100 SW Koll Pkwy., Beaverton, OR 97006
Sales 1-800-234-KWIK (503) 644-5644
Fax 1-503-646-8267

CIRCLE 170 ON READER SERVICE CARD

You fill the room. Let Sharp fill in the color.



Actual Screen Image

Presenting the QA-1000 *True Color* TFT LCD Projection Panel.

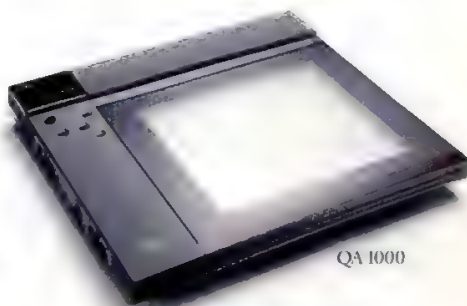
Now you can keep your audience glued to the big screen with the Sharp QA-1000 True Color TFT LCD Projection Panel.

By utilizing Sharp's most advanced LCD technology, the QA-1000 will turn your presentations into a showcase of dazzling and true-to-life colors, brilliance and contrast. What's more, because the QA-1000's LCD is active matrix TFT, you can even spice things up with *full motion animation*. Or punctuate your points with a fully discernible mouse.

The QA-1000 also offers automatic set-up for virtually adjustment-free operation with nearly all PCs (including the PS/2 and MAC II[™]). And, with its highly efficient cooling system, colors remain crisp and vivid, even after many hours of continuous use.

So go ahead, fill the room. With the QA-1000, we'll fill in the color.

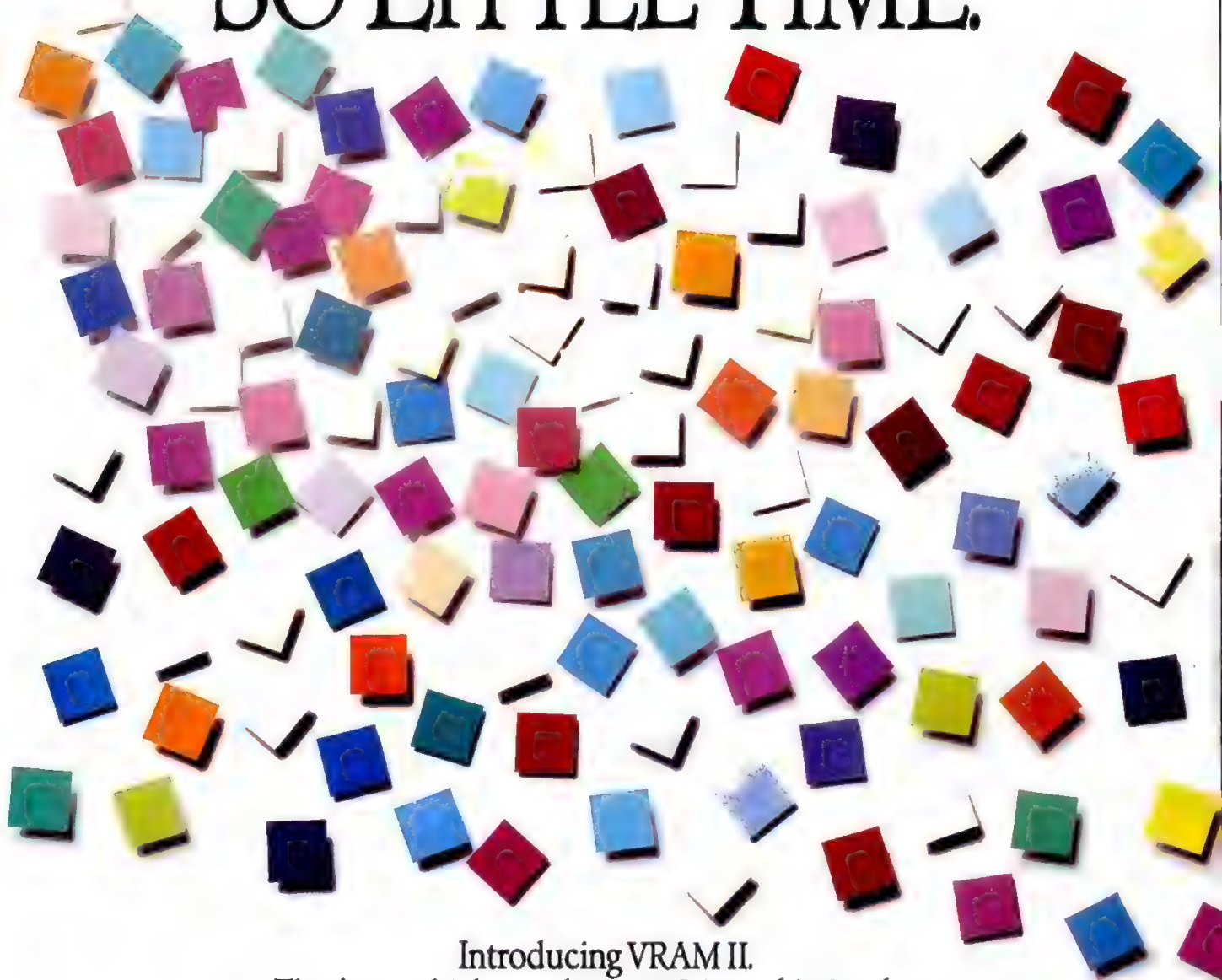
Contact your local authorized Sharp Professional Products dealer for a demonstration. Or call (201) 529-8731 • FAX: (201) 529-9636.



QA 1000

SHARP
FROM SHARP MINDS
COME SHARP PRODUCTS[™]

SO MANY COLORS. SO LITTLE TIME.



Introducing VRAM II. The fastest high-resolution VGA card in its class.

The quickest way to add more color to your work is to add our VRAM II™ VGA card to your computer.

You'll get up to 256 on-screen colors at 1024x768, interlaced and non-interlaced. And you'll get them faster than any other VGA card we could find. In fact, in benchmark tests, the more colors and the higher the resolution, the more we outperformed the competition.*

Our dual-port VRAM architecture is how VRAM II handles all that color and resolution so quickly. While one port is receiving information from the CPU, the other is sending information to the monitor. A very fast, very efficient way of doing things.

Which, no doubt, is why IBM is using VRAM in their new XGA standard for PS/2.

VRAM II is perfect for graphics intensive applications like Windows, CAD/CAM/CAE, and desktop publishing, especially on 386 and 486 machines.

The 1 MB version gives you up to 256 on-screen colors at 1024x768 (the 512K version gives you up to 16). Both have ergonomic 72 Hz refresh rates that virtually eliminate screen flicker, a full range of software drivers, and come complete with 7 year warranties.

For the best high-resolution VGA card, call 1-800-238-0101. In California 1-800-962-5700. In Canada 1-800-548-0624.

Because nothing else makes your work look better, faster.

VIDEO SEVEN
WE MAKE YOU LOOK GOOD.

CIRCLE 149 ON READER SERVICE CARD

*PC Magazine Labs Windows Benchmark Version 1.1 running under Windows 3.0. © 1991 Headland Technology Inc. Video Seven and VRAM II are trademarks of Headland Technology Inc. All other names may be trademarks of their respective companies.



FACT FILE

ImageStation

Yale Graphics,
8220 Northcreek
Dr., #100,
Cincinnati, OH
45236; 513-791-
9253.

List Price: \$795

Requires: 2MB RAM, hard disk, VGA or
Super VGA graphics adapter, DOS 2.1 or
later. Mouse recommended.

In Short: An expensive package aimed at
corporate graphics departments, *ImageStation*
offers exceptional color support, but its
awkward design and abysmal documentation
make it a questionable choice for all but a few
specialized users.



CIRCLE 406 ON READER SERVICE CARD

software's awkward design and its weak support for text charts make it unsuitable for ordinary business users. Even professional graphic artists may chafe at its limitations.

ImageStation is composed of three main modules: graphing, drawing, and paint. Typically you prepare graphs in the graph module, save them as drawings, and then bring them into the draw module for sprucing up. The paint module lets you incorporate high-resolution bitmap images into your presentation. It does not have a fat-bit editing capability, but it's still useful for cropping and color-adjusting Targa images prior to importing them into a drawing.

The program uses a proprietary graphical interface with several layers of menus. Though this system is not difficult to use, it's often clumsy. The menus are sometimes unintuitive: For example, the explode item on the menu for modifying

GRAPHICS PRESENTATION GRAPHICS

pie graphs explodes all slices as a group. If you want to explode a single slice, you need to select the slice with a mouse; the menu then adds a move slice option. *ImageStation* uses menu options rather than dialog boxes for each aspect of an object. The problem is that you can't see all the choices at once. While the graph and drawing modules are object oriented, you can't just select and drag objects at will. Instead, you have to select then choose a move or resize item from one of the menus.

There is no undo feature, so you must save work in progress frequently. Saves are not straightforward, since the file save menu item is often on a different branch of the menu tree from where you are working. Working in draft mode to avoid the time delays of working in full-color presentation mode is not smooth either. The draft mode is not quite WYSIWYG, so positioning objects precisely can be quite difficult.

ImageStation's awful documentation is by far the biggest barrier to ease of learning. It lacks an index and tutorial and is often incomplete and badly organized. For example, there is no documentation for the proper formatting of data when importing a Lotus spreadsheet. And the discussion of CGM files is spread over several pages, so it's hard to figure out that you must run a file-conversion program from the main menu to import a CGM file. The program has context-sensitive help but lacks any overview or browsing capability for this utility. Given that technical support is free for only 90 days, the problems with the manual seem even more severe.

Suitability to Task

ImageStation

	Word charts	1			
	Data charts		2		
	Pictures and diagrams		2		
	Technical charts		2		
	Business presentations	1			

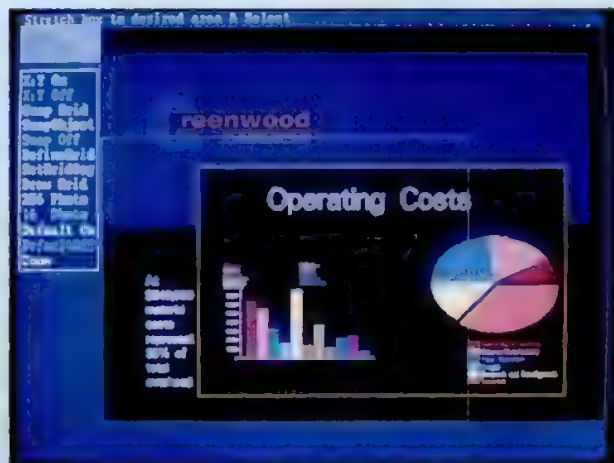
NOT READY FOR BUSINESS

The more advanced presentation features available in business-oriented presentation packages are missing here. You'll find no slide sorter, outliner, or facility for printing speaker's notes or handouts in *ImageStation*. And while you can create screen shows, you can't add transitional effects.

Text handling and word charting also lack a number of niceties. Text charts have only titles and one level of subtitle, only two types of bullets, and no support whatsoever for columns. The text chart module adds so little that you'll find it easier to manipulate text objects entirely in the drawing module, which is where you'll need to go to make final adjustments anyway.

Yale Graphics uses Bitstream font outlines, but not in the formats sold by Bitstream to end users. So while the fonts are of high quality (though spidery), you're limited to what's offered by Yale. The package ships with only two font families included; you can purchase a \$395 font pack with an additional 13 typeface families plus math symbols, Arabic, and Cyrillic.

By the current standard, *ImageStation*'s business-charting capabilities are limited. It has the basics: pie charts and column charts, and for technical types it does line plots with error bars and log axes. But it can't create horizontal bars directly unless you make a column chart and use the draw module to rotate it. Nor can the package create speciality combinations like linked pies. And the procedure for importing spreadsheet data is downright archaic: Before you do it, you must first choose data and label ranges in the spreadsheet, just as you do when making a graph.



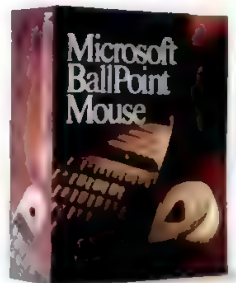
ImageStation can produce spectacular output that incorporates full-color Targa images. Each color is stored in a full 24-bit representation.

We've launch solve proble



The new Microsoft® BallPoint® mouse represents one giant step for you and your laptop computer.

That's because new BallPoint is the first and only mouse specifically developed for laptops. It's compact, yet includes all the features that made the



ed a mouse to ms in space.



Microsoft Mouse the industry leader.

Simply attach it to either side of virtually any laptop keyboard, and adjust it to the most comfortable angle. Then thumb your way through Microsoft Windows[®] graphical environment version 3.0 and all your favorite mouse-driven applications.

And for a limited time, you can get a free BallPoint mouse when you purchase a

COMPAQ notebook or laptop PC.

Just call (800) 541-1261, and ask for Dept. P43. They'll send you everything you need to know about the mouse designed to go where no mouse has gone before.

Anywhere.

Microsoft
Making it all make sense[™]

trademarks and BallPoint, Making it all make sense and Windows are trademarks of Microsoft Corporation. COMPAQ is a registered trademark of Compaq Computer Corporation.

SPECTACULAR OUTPUT

ImageStation's drawing tools and the quality of its output shine. You can add a gradient fill to virtually any item, but instead of standard fills, which are constant along an axis, *ImageStation's* fills offer an attractive mottling that looked excellent in slide output. You can add a shadow to any shape or text with a simple menu choice that controls the color of the shadow, borders, and more. Several lev-

els of anti-aliasing also add to the output quality. Unfortunately the package comes with no clip art, and file import was limited only to CGM, .TGA, and Lumena's .PIC format. A new version that will also support EPS, .PCX and TIFF should be available by the time you read this.

ImageStation's big strength is in its color handling. Each color is stored as a

24-bit object so that it can always be rendered with complete accuracy on a 24-bit output device. Surprisingly, the program does not use the Super VGA adapter's ability to pick 16 or 256 colors from an 18-bit palette, but instead uses the default colors without dithering. This means that while you can enter RGB values for 16 million colors, you can't get visual feedback for them. It also means that the on-screen representation of imported Targa

HOW WE TESTED: Presentation Graphics Packages

The presentation that our reviewers used to evaluate these presentation graphics packages consisted of six visuals designed to exercise the functions of the software in specific tasks—including word charts, data charts, drawing, annotation, and importing vector clip art.

After creating the presentation, we printed it on either a LaserJet or PostScript printer. We also imaged it on 35-mm. slides and on 8.5- by 11-inch overhead transparencies using the slide service bureau recommended by the vendor. If a direct communications link was available, we used it.

MASTER PAGE

The master page slide tests a package's ability to create a template. It consists of an imported logo, a chart frame, and a gradient background, as well as type specifications for a chart title. The logo—imported either as a CGM file or as a .WMF file—tests the quality of the file-import functions as well as the color-mapping capabilities of the software.



FREEFORM TEXT CHART WITH CLIP ART

This free-form text slide, a simple bullet chart with multilevel indents and multiple typefaces, tests the flexibility of the product's text-handling features. If possible, the slide was created by importing an ASCII file with multilevel indents; otherwise, the text was typed into the program directly. The reviewers selected one or two pieces from the program's clip-art library to dress up the chart. This gave them an opportunity for testing the program's image placement and scaling capabilities.



TWO-COLUMN TEXT CHART

This slide tests the program's facility at creating complex word charts. A two-column bullet chart was aligned on top of a gradient-filled shadowed rectangle; if possible, clip-art images were imported for use as fancy bullets. Not all packages directly support all of these features, so the reviewers came as close to the original as possible using the capabilities of their packages.

files isn't up to the high standard of a color reduction package like PHIPS.

ImageStation's full support for 24-bit color and its spectacular output on high-resolution color devices makes it an interesting option for some professionals. But its grave weaknesses in the areas of documentation, presentation management and charting—especially text charting—in addition to its high price make it a poor choice for most users.

Kinetic Words, Graphs & Art

by Ed Perratore

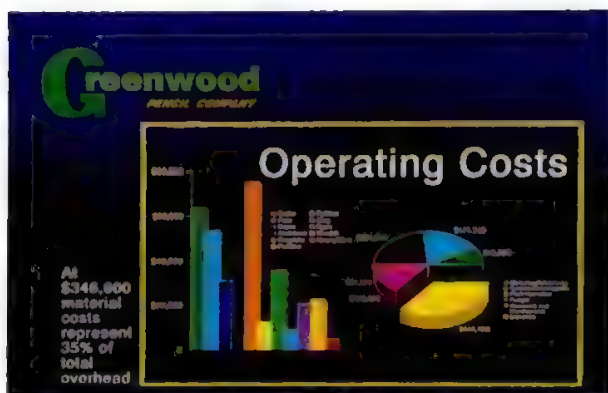
It's logical for a slide service to offer a package that helps clients create slides themselves. But *Kinetic Presentations* has taken a step beyond the high-end

program it once offered. The \$495 *Kinetic Words, Graphs & Art* is designed for beginners and graphic artists alike.

Version 2.10 of *Kinetic* has a modular design, with a similar interface across the board. In *Kinetic's* Words module, you can create text-only images with an array of text and background attributes. The Graphs module is where you build bar, line, pie, layer, and other varieties of charts. The Layout module lets you combine

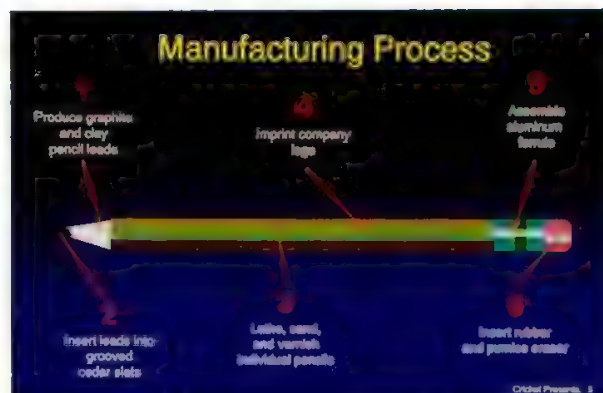
TITLE PAGE

The title page slide tests the basic graphic and text-handling capabilities of the product. These include the ability to place lines of text, to create filled, shadowed rectangles, to import and place a graphic image (an environmentally sprouting pencil—supplied in CGM or .WMF format), and to use multiple type sizes on a single page.



NUMERIC CHARTING

Although you'd probably never want to cram this much on a single slide in a real presentation, we created it to evaluate the software's ability to create and place two different types of charts, with legends, side by side within a frame. Besides helping reviewers evaluate the package's basic numeric charting capabilities (including data handling), this slide tests how easy it is to size and place the entire chart, as well as how much latitude you have for manipulating labels and legends.



ANNOTATED DRAWING

The final slide, an annotated drawing of a pencil drawn from scratch, exercises the package's freehand drawing features, including object creation, grouping, placement, and coloring. It also tests the program's ability to insert annotations using arrows and freeform text.

GRAPHICS PRESENTATION GRAPHICS

existing images into one, and the Art module offers graphics-mode editing (and CGM import) for a polished look.

These are all tied loosely together by a System module. All modules, with the exception of the Art module's drawing window, operate in character mode. You can use a mouse, but only in the drawing window. Each presentation, called a project, is organized into one .PRO file, but though you can edit this list, you can

change the order of images only by adding blank lines or moving lines as needed.

AWKWARD WORD CHARTS

The way you create or edit a word chart in *Kinetic* is old-fashioned: You must complete a fill-in-the-blank definition file. You can set the color palette, the orientation, a choice of several insets, and four-

way margins, as well as such text attributes as fonts (11) and colors.

What you can't do in *Kinetic* word charts is word-wrap or spell-check; you must edit line by line. If you import text from an ASCII file (to do this you must exit *Kinetic* and run one of two separate utilities), any text that does not fit into the word chart because of the chart's settings will not wrap or display unless you change the settings to a smaller point size.

As in the Words module, *Kinetic's* Graphs module uses a fill-in form for specifying options. *Lotus 1-2-3* files can be imported by row or column, but once they're in, your options are few. You can invert row/column headings during import and perform basic functions by column or row, but you can't perform the same functions on ranges. Cells with formulas import as zeros and not as values.

ENHANCING THE PRESENTATION

If you want to put more than one graph on a slide, you must use yet another module. In *Kinetic's* Layout module, you can select from nine preset layouts for positioning existing images or choose the "manual" option, which lets you select up to four images to position anywhere across a background image. You pick the top, bottom, left, and right margins for each image and let *Kinetic* size them automatically, preserving the aspect ratio of graphs where necessary.

Enhancing the colors of your presentation is almost as easy to do. *Kinetic Presentations* supplies a chart of its 255-color palette to speed color selection throughout *Kinetic*. You needn't plug in numbers every time you create a slide, though.

MEXICO, Puerto Vallarta
MEXICO, Cancun

Enjoy a vacation on Mouse Systems
CALIFORNIA, Palm Springs

Mouse with a vision

Go places with Mouse Systems

Mouse Systems wants you to enjoy a tropical vacation on us. Simply purchase a Mouse Systems Mouse, Trackball, or Scanner. EVERY specially marked box contains a certificate for 4 days and 3 nights accommodations for 2 in a tropical paradise. We'll even prepare you for sunny beaches with a pair of stylish Mouse Systems sunglasses, absolutely FREE*!

Mouse Systems products provide accuracy, resolution and the highest reliability. And every Mouse Systems Mouse and Trackball is ergonomically designed for both right AND left-handed users. So choose one of the world's most accurate mice,

PC Mouse III, or Little Mouse/PC, or a Pagebrush scanner, or a White Mouse, Omnimouse, PC Trackball, or any other Mouse Systems input device. You'll be buying one of the most reputable and reliable products in the industry.

Buy a Mouse Systems product today. We think you'll see things our way.

*Vacation registration required



MOUSE SYSTEMS

Mouse Systems Corporation
47505 Seabridge Drive
Fremont, CA 94538
415/656-1117

MEXICO, Mazatlan
MEXICO, Cabo San Lucas

HAWAII, Kauai
FLORIDA, Daytona

HAWAII, Kona
FLORIDA, Orlando

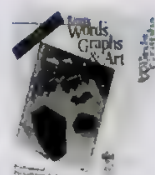



FACT FILE

Kinetic Words, Graphs & Art, Version 2.10
Kinetic Presentations Inc., 250 Distillery Commons, Louisville, KY 40206-1990; 502-583-1679.
List Price: \$495

Requires: 512K RAM, hard disk, graphics adapter, DOS 2.1 or later.

In Short: This old-fashioned character-based package is reasonably solid in its features and offers a tight link to the company's slide service, but its modular design and inherent limitations make it less useful than many other, more modern competitors.



CIRCLE 408 ON READER SERVICE CARD

CIRCLE 120 ON READER SERVICE CARD



"We're going with CO/Session.TM They won the evaluation. No contest."

Companies Everywhere Are Discovering CO/Session Remote Communication Software

CO/Session enables you to operate a distant PC over ordinary phone lines as though you were seated at its keyboard. From another PC, you can run programs, access data, print reports and transfer files.

A Proven Winner

Evaluate CO/Session for yourself. If it doesn't outperform the competition, return it within 60 days for a full refund.

The Fastest

CO/Session's speed is unbeatable at screen updates, keyboard response and file transfers.

"CO/Session led the pack in remote control performance."

PC MAGAZINE

"The fastest product we tested."

INFOWORLD

Advanced Features

The first and only remote software that allows you to use a mouse to operate programs on a distant PC.

CO/Session requires the least memory of all packages. It's also the first and only remote package to run in expanded memory, requiring only 5K.

Full graphic support including CGA, Hercules, EGA and VGA.

Multiple levels of security, including the ability to restrict callers to specific directories.

CIRCLE 735 ON READER SERVICE CARD

Easy-To-Use

"CO/Session is easy to use . . . offering simple installation . . ."

PC MAGAZINE



"Its interface is intuitive"
LAN MAGAZINE

Strongest Support

Call Triton at 800-322-9440 for a fast, knowledgeable response to any question.

**CO/Session. Another Great
Connection from Triton.**



TRITON TECHNOLOGIES

200 Middlesex Turnpike, Iselin, NJ 08830
908-855-9440/Fax: 908-855-9608

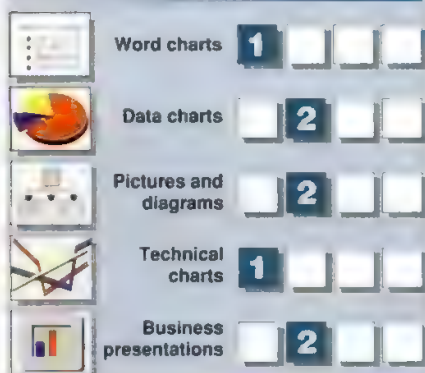
See us at COMDEX Spring, Booth #4601 and PC EXPO, Booth #226

GRAPHICS

PRESENTATION GRAPHICS

Suitability to Task

Kinetic Words, Graphs & Art



Each module's menus let you create or edit palettes using letters to represent commonly used colors. You can have as many colors (undithered only) from the vendor's palette as you want within one slide, even if you can't display them. Unfortunately, you can't mix colors to produce special blends, and you can't create gradient fills at all. Kinetic Presentations' slide service will do this for you, but only for background fills.

To further polish your presentation, you can import clip art, symbols, and definition files from an included library of more than 450 files. The definition files, like any others you create, can be used as templates. Other CGM files may show some on-screen distortion of color. You'll need to redefine colors and shading options to get around this problem, but this can be time-consuming.

AN ARTISTIC VIEW

Once you've imported your self-created or clip-art image into the Art module, you

have a number of options. Objects can be freely selected, combined, broken apart, and zoomed. You can jump around a user-specified number of points with each touch of the cursor key by means of the Snap feature. You can create lines and polygons (containing up to 1,000 points each) and text (in your choice of font, color, and other attributes); an undo function awaits if you make a mistake. You can also change the attributes of text, lines, edges, and fills whether or not these objects were created in the Art module. The need to import images that you've created in other *Kinetic* modules can be bothersome. The extra graphics-mode capabilities make the trade-off necessary for good results.

To enhance the look of your word charts, you can add bullets (nine styles not counting clip-art symbols), single and double underline, accent fonts, highlights, and both superscripts and subscripts. Any other enhancement before output to a black-and-white or color device (including several film recorders, the HP LaserJet and PaintJet, PostScript printers, and other selections), to a file, or to a Kinetic slide service (using the integrated communications software) must be done in the Art module.

Although documentation, including *Kinetic's* printed tutorial, is first-rate, the program's on-line help facility can be frustratingly sketchy at times. The need to backtrack to the main menu simply to switch from one module to another is another drawback. *Kinetic Words, Graphs & Art* is easy to use and will satisfy many. But there are more straightforward alternatives.

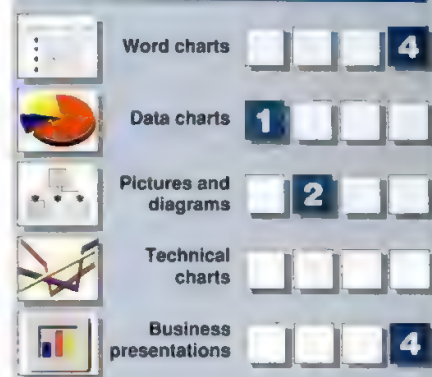
Microsoft PowerPoint

by Kellyn S. Betts

Microsoft PowerPoint (\$495) is a new kid on the presentation graphics block, but its snappy looks and unique features should ensure instant popularity with business presenters. It's very attractive, follows the latest fashion trends in presentation management, works under the currently hot operating environment of *Microsoft Windows 3.0*, and has that exotic "Mac package" allure.

Suitability to Task

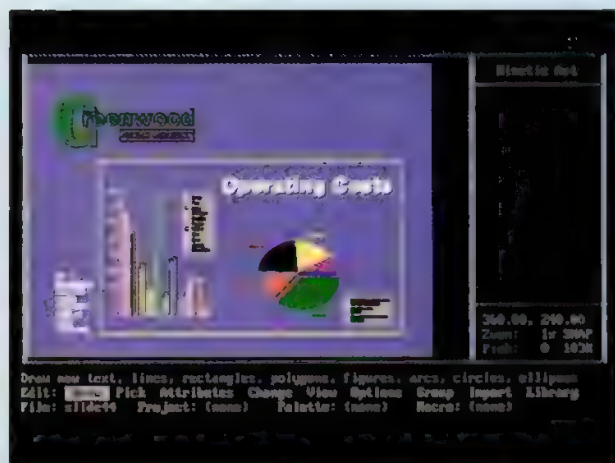
Microsoft PowerPoint



Presentation management capabilities are what we've been demanding from PC packages, and Microsoft's new package has them in spades. Following the trend started with Macintosh and first brought to the PC with *Xerox Presents* (now *CA-Cricket Presents*) two years ago, there's no such thing as a single slide in *PowerPoint*; the basic unit is the presentation. All presentations have at least two components: slides (which may be created with 35-mm. film) and speaker's notes, which are both automatically generated.

To ensure that presentations have a cohesive look, you can use the program's master slide feature to create a template of the standard features—such as background and foreground colors, logo size and positioning, and text font, size, and color—for use with every slide in the presentation. The master slide template comes up every time you create a new slide or copy a slide from one presentation to another. Unless you specify otherwise, the new or newly added slide takes on the characteristics of the master.

Microsoft has also taken pains to help



If your other modules of *Kinetic Presentations' Kinetic Words, Graphs & Art* don't give you precisely what you need, the Art module will take the image from there. The legends of this dual-graph image, for instance, were created within this module.

PC
MAGAZINE

FIRST LOOKS

IBM's Model 90:
PS/2s Go the Next
Round with 486 Power
And XGA Graphics

SOFTWARE

Now You C:> It.

PCs
5 M
You
Or J

Mor
PC
33-M

BE
19
7th Annual
Technical E
The Year's
Editors' Pe
Gaffe Riot:
the Year's



AT 9ms, THIS SHOULD BE ON THE COVER.

Stop the presses, call the editor. Now you can get more speed, more room, more power, more of everything. Except price.

Presenting the Hardcard II XL™. A 9ms hard drive designed for 286/386 systems.

Now here's the news. *The New York Times* says Hardcard II XL offers "more speed than regular drives for a comparable price."

And the numbers confirm this. 9ms effective access time¹ and 14 MB per second transfer rate² mean your system runs 8 to 9 times faster than standard hard drives. With 50 or 105 MB capacity, you have enough room to run Windows™ 3.0.

There's also a two year warranty and a level of service and reliability our customers (and *PC Magazine**) tend to brag about.

All this for about the same price as the standard old 28ms drive.

Nice cover.
For your nearest dealer,
call 1-800-624-5545.



THE 9ms ERA
XL
HARDCARD II XL™

*PC Magazine service and reliability survey ranked Plus Development #1. September 25, 1990.

CIRCLE 147 ON READER SERVICE CARD

Any bill. Any bank. Anywhere. Any questions?



Finally, an electronic payment system that responds to all your bill-paying needs. CheckFree®

Imagine using your personal computer to pay your bills faster and easier than ever before, without the hassles of checks, envelopes, and stamps. Think what it would be like to pay all your bills and do all your recordkeeping with just a few keystrokes in just minutes per month. Now you can, with CheckFree, from Checkfree Corporation—the nation's leader in electronic payments.

Making payments with CheckFree is simple. Just pick the dates you want your bills to be paid, specify the amounts, and your software sends the information via modem to the CheckFree Processing Center. Fixed, recurring bills such as your mortgage can be paid automatically.

Many payments can be sent electronically from your account to their destination. Checks or laser-printed drafts are sent to individuals or companies not yet linked to electronic funds transfer networks.

With CheckFree, you don't have to switch banks, and you can pay any individual or company in the United States. That's because your payments are cleared through the Federal Reserve System, the same system that clears your checks today.

All CheckFree transactions are automatically recorded by the software and documented in your bank statement. Non-CheckFree transactions can be entered easily; and all your records, as well as specific reports of your finances, can be accessed through a few simple commands. (And that's especially helpful at tax time.) Plus, you can export CheckFree data to TaxCut® and any spreadsheet compatible with Lotus 1-2-3®.

CheckFree is also seamlessly integrated into Quicken®, Managing Your Money®, and Checkwrite Plus®. So you can enjoy CheckFree's automation with any of these leading financial software products.

Any questions? We have the answers. Call our toll free number right now. Any comments? Here is what the experts say: "CheckFree makes bill paying a quick, painless task rather than a monthly ritual to be dreaded..."—**PC Magazine**. "I said I'd try it, but I wasn't sure I'd like it. I like it."—Chris Shipley, **PC Computing**.

Any doubts? If you don't agree that CheckFree software delivers a faster and easier way to pay your bills, we'll refund



CheckFree® software is available at leading retailers and direct order dealers including Egghead Discount Software®, Electronics Boutique®, Babbage's®, Waldensoftware®, Software Etc., Soft Warehouse®, Radio Shack®, Best Buy®, Price Club®, Sam's Warehouse Club®, PC Connection®, MacConnection®, MicroWarehouse®, MacWarehouse®, and CompuAdd®.

your money.* So don't waste any more time (or checks or envelopes or stamps). Get CheckFree today.

CheckFree software is available at retail stores, or by phone for \$29.95 plus \$4 shipping and handling. CheckFree service is only \$9.95 per month for your first 20 payments, then \$3.50 per each additional ten payments or portion thereof. That's not much considering the time you save and hassles you avoid. Plus your first month of service is free.

Call **1-800-882-5280**

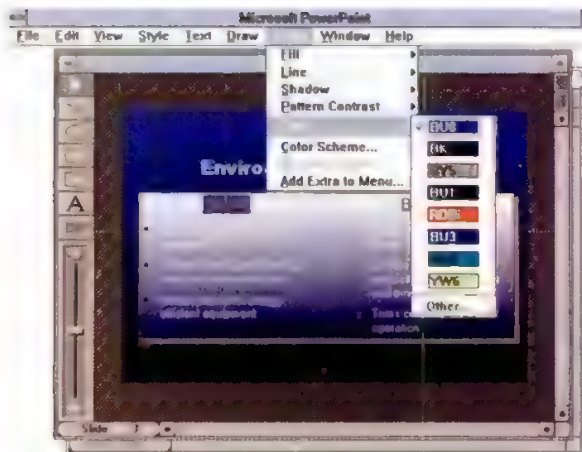
CheckFree®

Hardware Requirements: IBM® PC/Compatibles with 512K RAM, MS DOS® 2.1 or higher, two floppy drives or a hard disk system, or Apple Macintosh® 512K or higher, 800K drive, and a Hayes® compatible modem.

CheckFree is a registered trademark of Checkfree Corporation. All other trademarks are the property of their respective corporations.

*Money back guarantee on software valid for direct orders only: return within 30 days of purchase for a full refund.

GRAPHICS PRESENTATION GRAPHICS



With the appropriate *Windows* driver, **Microsoft PowerPoint** can support 256 colors, which makes for impressive on-screen thumbnails and smooth gradient backgrounds. You can easily recolor any slide object by picking from color-coordinated palette boxes.

PowerPoint users create visually attractive output. The software features an entire subdirectory of templates that can be used as master slides, including 29 templates with dramatically shaded backgrounds—such as tiles, concentric circles, and 3-D cubes—that are specifically designed for 35-mm. output. If you're designing your own background, the program automatically suggests foreground colors (for text, boxes, bullets, and other elements) that complement the background color you choose. You don't have to accept its suggestions, however; you can mix colors to your heart's content and customize your palettes at will.

LOOKING GOOD

It's no surprise that *PowerPoint* looks quite good: You can display 256 gorgeous

nondithered colors with the appropriate *Windows* driver. Shaded backgrounds and on-screen slide shows look fantastic on this setup, though the program does not have a runtime module or any fancy transition effects. Color mapping is also good, thanks to an inverse gray-scale option that you can use to invert the color scheme so that you get dark print on a light background instead of the opposite. Microsoft has an especially thorough link with Genigraphics' nationwide network of slide service bureaus that practically guarantees good-looking slides. Not only are its color palettes designed especially to work well together on slides, but when you "print" a presentation to the driver, the built-in software link checks it for problems and alerts you to them before letting you send them by modem.

NO FORMS CHARTING

PowerPoint takes a minimalist approach to producing word charts. It offers no templates of any kind; instead, it uses a word processing tool (not to be confused with its annotation tool, which works like the text tool of many drawing packages) and a variety of menu-based formatting options for creating text in a large number of different fonts, sizes, colors, and styles, and then displaying it with a variety of margins, indentations, and justifications.

These tools work well enough, especially if you're willing to invest some time in reading the hardcover manual, which does a good job of describing how to make typical charts like bulleted lists and formatted tables. Unfortunately, since Microsoft does not really consider text or word slides to be a type of chart, these dis-

cussions are interspersed throughout the manual. As a result, using *PowerPoint* to create slides composed mainly of text takes somewhat longer than it does with fill-in-the-form packages. To create a text chart here, you must draw a box with the word processing tool, then add text to it that you can format later by resizing and adding bullets, indents, or tabs.

On the positive side, editing text is quite easy with *PowerPoint*: All you do is highlight the word or letters to be changed and make your corrections on the chart. The program really gives you a chance to play around until you find the best way to display your text. You can fearlessly experiment with many different typefaces (which *PowerPoint* refers to as fonts) because after a piece of text is set, its size and style (bold, italic, underline, or plain) is retained even if the entire selection's font is changed. Multiple fonts can be displayed on a single page, and boxes can be specified to fit to text. You can also display an optional ruler with tab stop information. The package includes three scalable fonts and supports many other extra-cost *Windows* fonts, such as Bitstream's, as well as a wide variety of printer fonts that it displays in WYSIWYG fashion. A spelling checker and an on-line tutorial that is as much fun to use as many designed for the Macintosh are also included.

RIGID WITH DATA

The praise flows less freely when it comes to data charting. *PowerPoint*'s text-charting options may be less formatted than you like, but its data charting capabilities are downright rigid.

PowerPoint's charting module is really a separate program grafted onto *PowerPoint*, and it's surprisingly inflexible. With six basic graph types, its basic capabilities are good enough. If you're willing to invest some time, you'll be able to create simple business charts. But it can be quite awkward to use.

The problems begin with the data sheet. If you've imported a range of data, you can't just designate a row or column to be the *x* or *y* axis or the series and labels or independent and dependent data. Instead, you must have the data in the right form or at least describe the form you have it in by properly using functions like include, exclude, and series in columns or rows. In many cases, the data must be in the first row and column of the data sheet in order to be graphed properly.

FACT FILE EDITORS' CHOICE

Microsoft PowerPoint, Version 1.0

Microsoft Corp.,
One Microsoft
Way, Redmond,
WA 98052-6399;
800-426-9400, 206-882-8080.
List Price: \$495

Requires: 286-based PC or better, 1MB RAM, hard disk, EGA or VGA graphics adapter, mouse, DOS 3.1 or later, *Windows* 3.0.

In Short: Though its charting and drawing tools are perfunctory, *PowerPoint* is unexcelled at helping you turn out business presentations quickly and easily. A host of convenience features—from flexible slide masters for word charts to coordinated color schemes—makes slide presentation about as easy as it can be.



GRAPHICS PRESENTATION GRAPHICS

You choose the chart you wish to create by clicking on its visual representation in the graph program and specifying any additional options, like "show percentage." This sounds simple, and it works well enough if you've described your data properly, but you can't edit much on a chart after it's been created. The chart is automatically positioned in the center of its display window and the data labels created for it are uneditable, though they are often weirdly broken ("Commissions" was an example in one of the charts we created). One of the legend positioning options allows it to be moved, but there's often unavoidable overlap. Even worse, once one chart is moved onto another, its components cannot be edited. You must erase and then regenerate it to make changes.

If you're an *Excel* user, however, these criticisms don't apply. Through the magic of OLE (object linking and embedding) technology, *PowerPoint* can access the powerful charting engine in *Excel* 3.0 in the same way you'd access a *PowerPoint* chart: Simply click on the chart and *Excel* pops up ready to do your bidding. The link even shows up on *PowerPoint*'s file menu

as an option if both packages are installed under *Windows* 3.0. *PowerPoint* also imports graphs saved as images in any of the formats it supports, and by the time this article comes off the press, Microsoft should be shipping a utility that will allow you to convert *Harvard Graphics* files into editable *PowerPoint* images.

PLAYING DRESS UP

PowerPoint contains sufficient drawing and image editing tools, as well as coloring options, to allow you to dress up a chart once it's created. These tools don't serve well for image creation, however, since they lack the ability to create fillable polygons or objects by joining lines or other shapes. On the other hand, you may not need to create images. This program imports five formats of vector images. It also supports cutting and pasting through the *Windows* clipboard and contains over 400 pieces of attractive, resizable color clip art. Unfortunately, *PowerPoint*'s export ability doesn't meet the level of its imports: The only means of exporting files is through the *Windows* clipboard.

PowerPoint is by no means perfect, but its master slides, color schemes, text charting, and other timesaving features lift it head and shoulders above the crowd when it comes to creating business presentations quickly and easily. Unless you're firmly entrenched in the DOS world or have special charting needs, it's the best you can buy today.

Pixie

by Paul Murphy

A little magic goes a long way, especially when it's wielded by Zenographics' *Pixie*. This \$295 package, as easy to use for charting as any on the market, produces slides that are a match for those turned out by programs costing twice its price. But *Pixie*'s magic runs out when it comes to complex data manipulation and word charting.

Pixie 2.0 runs under either *Microsoft Windows* 2.x or 3.0 and takes advantage of most *Windows* capabilities. While other packages force users to manipulate data to change chart elements, *Pixie*'s lines, bars,

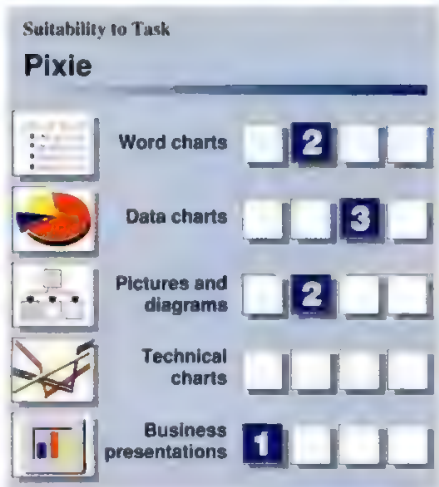
Eeeek!

New APPLAUSE II™ version 1.5 is the easiest way to create spectacular business graphics. And the free Microsoft Mouse inside each box (a \$125 value) makes it even easier and faster. Because



the APPLAUSE II "windows-like" interface was designed for the mouse.

GRAPHICS PRESENTATION GRAPHICS



and pies can be modified directly. In fact, *Pixie* is so object oriented that you can actually change the value of data by stretching a bar or pie slice! (Not that this is a good way to endear yourself to your financial people.) Other smart objects make chart creation easy and intuitive. For example, using the color tool to change the color of an item in a legend changes the color of the corresponding bar or slice instantly. Changing the first x-axis label from Monday to January changes the rest

of the labels to months, and creating a second pie chart is as simple as duplicating the legend on the first pie chart. Bullets on word charts are also "smart" objects that appear in appropriate places, even on data imported from an ASCII file.

A WINDOW ON CHARTING

Experienced *Windows* users will quickly feel comfortable with the way *Pixie* uses *Windows*' multiple document interface to display multiple slides or charts in overlapping windows. *Pixie* cannot take advantage of a 256-color *Windows* video driver; instead, it displays 98 dithered colors from a palette of 16 million. No RGB values are given, so color matching without a test color print is a bit of a problem.

New slides or charts are always constructed from default templates, so the first step in building a chart is reconstructing the template items. This may sound daunting, but *Pixie* has tools to make the task easy. *Pixie*'s logically constructed toolbox displays icons representing its drawing and editing functions.

FACT FILE

Pixie, Version 2.0
Zenographics Inc.,
4 Executive Circle,
Irvine, CA 92714;
800-366-7494,
714-851-6352.
List Price: \$295

Requires: 286-based PC or better, 1MB RAM, hard disk, EGA or VGA graphics adapter, mouse, DOS 3.1 or later, Microsoft Windows 2.1 or 3.0.

In Short: An interesting program with some nice charting tricks and good-looking output. *Pixie* falls short when it comes to word charting and presentation management.

CIRCLE 411 ON READER SERVICE CARD

You create word and bullet charts by importing tab-delimited ASCII text into templates. Bullets are automatically assigned, but there is no word-wrap control of text, so if any text overflows, you must cut and paste it manually to new lines. Text formatting, such as shadowing and font control, is assigned using Toolbox items. *Pixie* 2.0 is packaged with four basic typefaces from the Bitstream Fontware series, comprising the impor-

There's A Mouse In The Box.

Which means you can do bar, pie, line or word charts—or draw—simply by pointing and clicking. Create 35mm slides, overheads, hard copy or on-screen presentations. In black and white or in your choice of 36 million colors.

InfoWorld says APPLAUSE II is "easier to work with than either Harvard Graphics or Freelance Plus, and faster than the Windows-based prod-

checker, full LAN capability, 700 pieces of clip art, and much more. Including an all-new RunTime that lets you show screenshows to colleagues who don't have APPLAUSE II.

Call 1-800-437-4329 ext. 1311 now for a free demo disk* and the name of your nearest dealer. Current users can call 1-800-2ASHTON to upgrade to APPLAUSE II version 1.5 for just \$50.**

ucts." And *PC Magazine* says APPLAUSE II has "a fluidity and ease-of-use not found in either Harvard Graphics or Freelance Plus."

Version 1.5 adds an 80,000-word spelling

But mouse supplies are limited, so act now. If you miss out on this very special opportunity, it's going to gnaw at you.

Ashton-Tate®

Some days you have
all the time in the world.



When the pressure is on, pour on the speed. With Hewlett-Packard's new LaserJet IIIISI printer. A powerhouse that delivers at a throughput speed of 17 pages per minute.

With the LaserJet IIIISI, you're up to speed the moment you give the "print" command. HP's RISC-based formatter and the PCL5 printer language, with vector graphics and on-the-fly typeface scaling, yield fast

results. This printer also represents a new standard for I/O performance with optional Network Printer Interface cards for either Ethernet or Token Ring.

The LaserJet IIIISI is specifically designed for shared-use environments. Its high-volume paper handling features include two 500-sheet input trays and a monthly duty cycle of 50,000 pages. HP offers software-selectable language switching

between PCL5 and optional Adobe® PostScript®. For added versatility, your options include

Adobe and PostScript are registered trademarks of Adobe Systems Inc. in the U.S. and other countries.



And some days you need the new 17ppm LaserJet III Si.



an envelope feeder and two-sided printing.

Beyond speed and efficiency, the LaserJet III Si delivers the sharpest 300 dpi print quality yet. In fact, HP's revolutionary combination of Resolution Enhancement technology and new microfine toner challenges the print quality of many 600 dpi printers.

The price of the new LaserJet

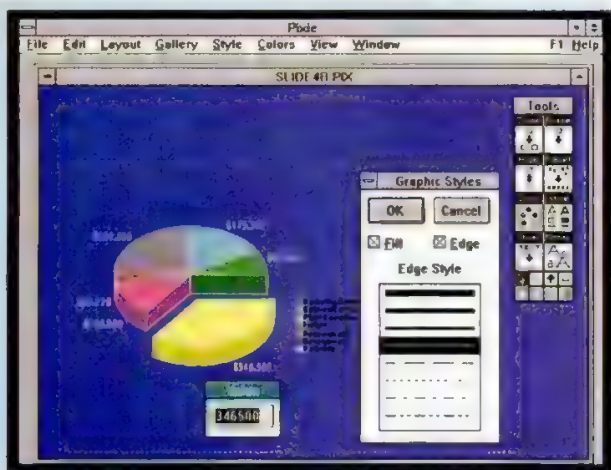
III Si, just \$5,495,* is as impressive as the work load it handles. To order Hewlett-Packard products, please call your Intelligent Electronics sales representative.



**HEWLETT
PACKARD**

CIRCLE 218 ON READER SERVICE CARD

GRAPHICS PRESENTATION GRAPHICS



Pixie produces sharp-looking charts with an unusual twist. Just double-click on a pie slice to display the value behind the slice. You can enter a new value in the box or drag the slice to change it graphically.

tant Dutch and Swiss faces as well as Courier and a Symbol font.

DARK SIDE OF THE SPRITE

Alas, all magic has a dark side. Although *Pixie* is easy to use, it cannot handle complex data imports; nor does it possess the faculties of an adept presentation processor.

Though you can dynamically link data in a Microsoft *Excel* spreadsheet to a *Pixie* chart using a supplied *Excel* DDE macro, *Pixie* is unable to import more than one named range at a time from a *Lotus 1-2-3* spreadsheet. A second import overwrites the first, so if labels and data are in separate named ranges, this can be a fatal flaw. Opening a .WK1 file in *Excel* and importing the data using the DDE macro can cause multiple Unrecoverable Application Errors until you clear the named ranges and bring in pure data. Even then, the data may need to be liberally massaged to get it into a format that *Pixie* can graph.

Besides these deficiencies, *Pixie* lacks sophisticated presentation processing tools. You can print files using a rudimentary batch processor, but that's the limit of its presentation management tools. You can have screen shows, but only if both *Windows* and *Pixie* are installed on the computer running the presentation.

Our output to a slide service was done in the .IMA format that is proprietary to Zenographics' high-end graphics product, *Mirage*, a popular program among slide services. Charts were crisp and sharp, but the local service bureau picked up some inconsistencies between the font metrics of the Bitstream fonts used by *Pixie* and those used by the service's copy of *Mi-*

rage. Because of its expertise with *Mirage*, the service was able to make corrections without much difficulty.

An updated version of *Pixie* (Version 2.3) was in beta testing at the time of this review. This new version substantially improves screen redraw speeds, streamlines the already useful Toolbox, and adds much-needed alignment tools and the Zenographics Supertext program to speed on-the-fly font creation.

For those who need to prepare charts quickly and easily, the current version of *Pixie* may be the best choice. But be warned: There is a limit to this *Pixie*'s powers.

Presentation Team

by Rock Miller

Presentation Team proves that you don't need to use *Windows* to get a useful presentation program. A complete rewrite of Digital Research's earlier graphics offerings, this \$495 package is easy to use but far from simple-minded.

Designed for basic business presentations, *Presentation Team* does have a few inherent limitations. Though you work with entire presentations rather than individual images, it has no outliner or thumbnail slide sorter—just a rudimentary title sorter that shows filenames but not descriptions. Colors are limited to 16, plus whatever effects you can achieve by using fill patterns. You can't create custom palettes, apply global color schemes, or use gradient fills on objects. And you can have only one common background

per presentation.

Even so, don't underestimate *Presentation Team*'s sophistication. Its GEM-based graphical interface, complete with toolbox and preview boxes, lets you move and size all objects interactively: You can alter their characteristics by pointing and clicking. Charts, pictures, and backgrounds can be referenced to disk files, letting you create a consistent look by sharing common elements. You can even share these files over a network, though the program needs 512K of RAM to run comfortably. And it certainly lived up to its billing in the ease-of-use department: I seldom had to refer to the program's generally well-written documentation.

GOOD WORDS

Word charts, which form the bulk of most presentations, are *Presentation Team*'s forte. Unlike packages that make you place text line by line or box by box, *Presentation Team* treats word charts as objects made up of several linked paragraphs, each with its own style. With fully automatic outlining and bullet charting, paragraph styles are flexible enough to do just about anything with text. In addition, the program includes a comprehensive set of word chart templates. Whether you want a simple word-wrapped text box or a complex multicolumn outline, a handy preview makes it easy to find the right template for your needs. You can also easily create and save your own templates.

Text editing is easy: Simply open a word chart window on your visual and start typing. Fine-tuning paragraphs is easily done by dragging tabs, indents, and column stops on the ruler bar, and the menus give you intimate control over outline and bullet characteristics and interline spacing. Two Bitstream typefaces



FACT FILE

Presentation Team, Version 2.0
Digital Research Inc., Box DRI, 70 Garden Ct., Monterey, CA 93942; 408-649-3896.

List Price: \$495

Requires: 640K RAM, hard disk, graphics adapter, mouse, DOS 3.0 or later.

In Short: *Presentation Team*'s template-driven word charting and its flexible drawing tools make it an easy-to-use choice for DOS users. Weak data charting detracts from its considerable appeal, however.

CIRCLE 412 ON READER SERVICE CARD



LIKE MAGIC, CREATE SIGNS, LABELS AND STICKERS INSTANTLY!

Introducing the magic of STIKA!

STIKA is the revolutionary, compact and simple sign-making system from Roland Digital Group!

You can use STIKA with or without a computer. The built-in scanner allows you to easily scan and cut artwork (from any original, clip-art or printed piece) to create your own signs, labels, stickers and reverse iron-on transfers from



either vinyl or flock material measuring up to 3" x 23"!

With a wide variety of colors you can apply your creations permanently to walls, windows, cars, RV's, boats, cycles, shirts, hats and a lot more!

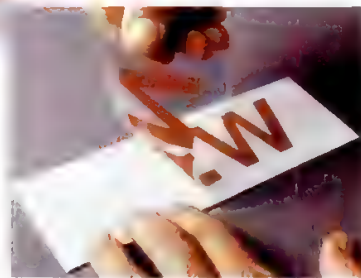
The magic of STIKA! Now the power to cut graphics and text from vinyl and flock rests directly in the palm of your hand.

Experience the Wizardry of STIKA!

2 Apply.
Your design is easily applied to just about any surface with pressure-sensitive vinyl or iron-on flock material.

1 Scan and Cut.
With STIKA's built-in scanner, simply scan the original art or text. Then with one push of a button, STIKA will cut your design in vinyl or flock.

3 It's finished!
Signs, labels or stickers are now ready for permanent display!



NEW

STIKA
Intelligent Cutting Machine™

NEW

INTERNATIONAL DISTRIBUTORS: U.S.A.: Roland DGA Corporation 1961 McGaw Avenue, Irvine, CA 92714 Phone: (714)975-0560 Fax: (714)975-0560 • CANADA: Roland DG Canada Inc. Phone: (604)270-6186 Fax: (604)270-6552 • AUSTRALIA: Roland DG Australia PTY Ltd. Phone: (03)818 0633 Fax: (03)818 0433 • NEW ZEALAND: Roland Corporation (NZ) Ltd. Phone: (09)398 104 Fax: (09)391 065 • ENGLAND, IRELAND: Roland (UK) Ltd. Phone: (0252) 816181 Fax: (0252)812992 • SCANDINAVIA: Roland Scandinavia A/S Phone: (31)95 36 22 Fax: (31)95 81 11 • BENELUX, FRANCE, GERMANY, AUSTRIA, SWITZERLAND & PORTUGAL: Roland DG Europe N.V. Phone: 32-14-57 59 11 Fax: 32-14-57 59 12 • SPAIN: Roland Electronics de España, S.A. Phone: (93)308 1000 Fax: (93)307 4503 • HUNGARY: Intermusica Ltd. Phone: (361)186 8905 Fax: (361)186 1117 • JAPAN: Roland DG Corporation Phone: (053)485-3177 Fax: (053)485-2735 • IF THE ABOVE DOESN'T COVER YOUR INQUIRIES, PLEASE CONTACT ROLAND DG CORPORATION, JAPAN

Roland
DIGITAL GROUP

CIRCLE 369 ON READER SERVICE CARD

GRAPHICS

PRESENTATION GRAPHICS

(Swiss and Dutch) in all styles are included, and you can extend this repertoire with additional Fontware-compatible typefaces.

Presentation Team does have a few shortcomings in this area. You can't see white text on the white background of the

basic business charts and even throws in some nice extras (its attractive map charts are especially notable). But its design feels rough and unfinished, and it proved frustrating and awkward to use.

Data handling is acceptable. You can flip rows and columns, and select columns to ignore in charting, though you can't link charts directly to external worksheets. But the default charts tend to look clunky, and when you try to fine-tune them you'll find yourself fighting with the unpredictability of the software. To take just two examples, the configuration and size of legends is determined (ineptly) by the software, and data labels aren't staggered or rotated to avoid collisions; all you can do is reduce the point size manually. Granted, you can get good results by converting the chart to a picture and editing it, but doing this on many charts takes more work than most people can afford, and, of course, you lose the link with your data as well.

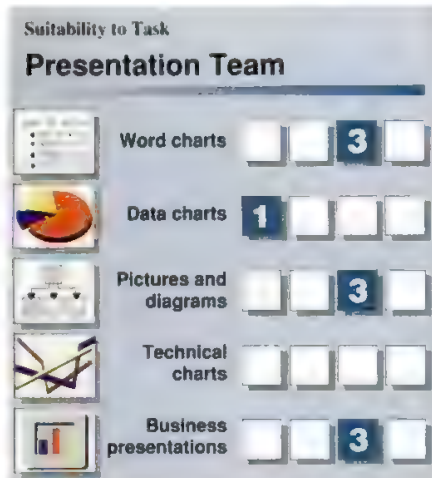
Fortunately, *Presentation Team* has good drawing tools to make up for it. Except for node editing and Bezier curves, it does just about everything you'd want. Once you've merged your charts or pictures with the underlying visual, it's easy to select one or more objects, group and ungroup objects, put them in front and back, and duplicate or flip them. You can add boxes, lines, arrows, and so on, with lines and borders continuously variable in .01-inch increments. Its only real demerits are the lack of a full undo function and its almost unusable rotate option. *Presentation Team* directly imports only .GEM (vector) and .IMG (bitmap) files, but it comes with a customized version of *Hi-*

jaak that can convert all major vector and bitmapped formats.

SNAPPY SLIDES

The proof of the presentation is in its output, and *Presentation Team* fares well on this score. Our test slides (imaged

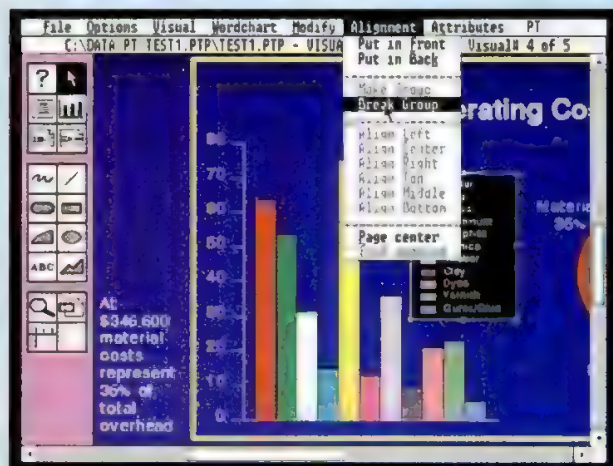
The proof of the
presentation is in
its output and
Presentation Team
fares well on this
score. Our test slides
were sharp and
well-rendered.



word charting box, for instance—a stupid design error that wastes a surprising amount of one's time. And it lacks some important timesavers: You can't import ASCII text files, there's no spell-checker, and though you can change the style of a single paragraph easily, you can't change a single attribute (such as the typeface) on multiple paragraphs while leaving the other attributes (such as size and color) intact. In all, though, word charting is one of *Presentation Team*'s strongest assets.

CHART TROUBLE

By comparison, *Presentation Team*'s data charting module looks like a poor relation. It offers a reasonable selection of



Once you've merged the objects with the underlying visual, *Presentation Team*'s drawing tools make it easy to get what you want on your slide.

through a built-in modem link to the MAGICorp slide service) were sharp and well rendered, with only a few color surprises (MAGICorp's sample palette slide didn't show the effects of fill patterns). Both color and monochrome PostScript output looked great.

Printing on a LaserJet, however, is a veritable minefield. The program's default drivers are 300 dpi, and since there's no draft-mode setting, you can't print on a 512K LaserJet, even at the half-page setting (I had to order a 150-dpi driver for the LaserJet Plus in order to print). Though you have the option of downloading soft fonts, printing is nonetheless slow, especially with dark backgrounds, and there's no easy way to invert the gray scales or recolor the entire presentation for monochrome output.

The program also suffers from its reliance on Bitstream's outdated Fontware technology. You must generate all font sizes separately to get correct output, but since the program scales the screen fonts automatically, you get no warning of missing fonts till you print. Four slides per page is the only handout option offered (there's no provision for speaker's notes), but to get this to work, you must generate a complete set of half-sized fonts, a fact that is not documented.

Despite its flaws, *Presentation Team* is

IT'S FREE

We Added...to DesignCAD 3D version 3.1: A Basic-like programming language entitled BasicCAD. We added new commands. We added hardware support for dozens and dozens of new devices. We made hundreds of overall internal enhancements!

We improved the manuals, the packaging and the speed.

How much extra did we charge? Nada. Nothing. Zip. No extra charge at all. Oh, sure...our accountant said we could increase the price. Our lawyer said there was no legal reason not to charge more. A minister said we had no moral obligation to keep the same price! So, why didn't we raise the price for DesignCAD 3D version 3.1?

Because...in the Great American Tradition we said

"Aw...What the Heck. Let's see the other guys beat this price!"

DesignCAD 3D version 3.1 sells for \$399.

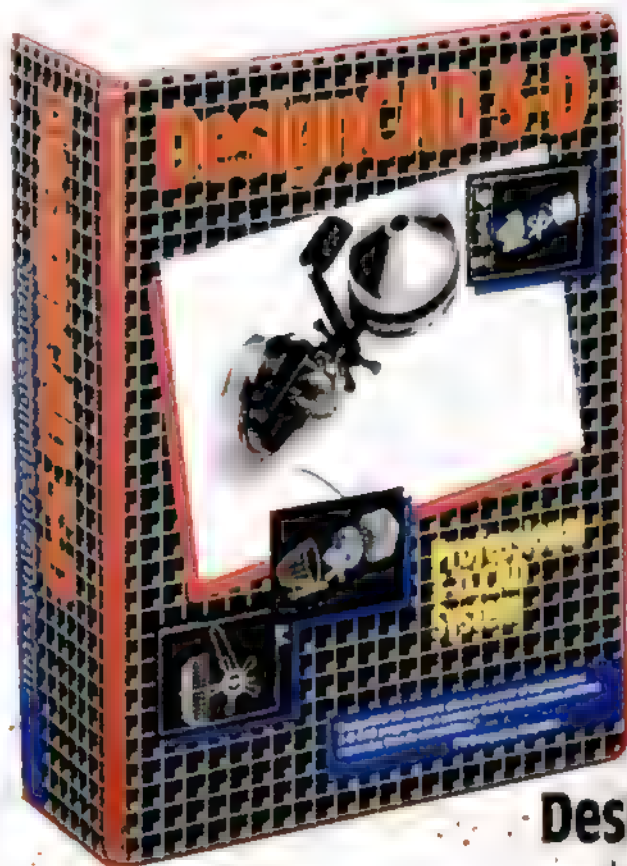
Does this include everything? Yes. We include everything! The programming language, the hardware device drivers (more than 450), built-in shading capability, hidden line removal capability, solid-object modeling capability, translators to-and-from other file formats, are all included!

How can you afford to sell a program like this at such a low price?

This is our most often asked question. We have a simple answer. Volume. We sell thousands of these programs each month! If we were to charge thousands of dollars per copy (like our competitors) we would restrict our sales to the professional trades only. By lowering our price we sell to professional architects and engineers as well as the ordinary individual! Many ordinary individuals purchase DesignCAD 3D for personal projects. Many people purchase DesignCAD 3D and perform CAD Drafting at nights and on weekends as a second job!

People design "dream homes" and "widgets".

The uses are limited only by YOUR imagination!



If there ever was a CAD program out to prove that AutoCAD, CADKEY, VersaCAD, and other \$3000 programs are overpriced, it's DesignCAD!

(MicroCAD News review)

**DesignCAD 3D
\$399**



December 11, 1990
DesignCAD 3D Version 3.1



American

Small Business Computers, Inc.
327 South Mill Street • Pryor, Oklahoma 74361
(918) 825-4844 • FAX (918) 825-6359

Remember - American Small Business Computers also sells a 2D version of DesignCAD. It costs only \$299! Write or call for FREE brochures that will help you determine which program best suits your need.

CIRCLE 475 ON READER SERVICE CARD

How to make accommodate every T



TOM: "Well, that's an accurate presentation of unit sales, but what I'd like to know is dollar sales...."

Now, you can answer all those "What if ...," "What about ..." and "What would happen ..." questions from every Tom, Dick and Harriet in the room. Instantaneously. In brilliant, photographic-quality color.

With the new In Focus 5000CX LCD projection panel.

Simply place it on your overhead, connect your Macintosh or IBM compatible computer and you



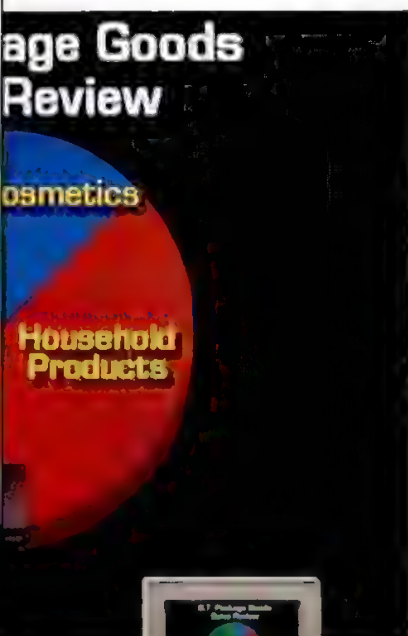
have one of the most powerful and persuasive presentation tools ever seen.

The 5000CX can project nearly 5000 colors at a time. And its 640 x 480 resolution supports all VGA, EGA, CGA and Macintosh video standards.

So you can access all of your computer's software. While you're presenting.

You can project new projections. Revise revisions. And tailor your presentation to accommo-

your presentation from Dick and Harriet.



DICK: "That was certainly quick. Have you got any data on the actual costs of goods?"



HARRIET: "That's not a pretty picture for the cosmetics division. By the way, do you think you could help me out on this presentation I'm giving tomorrow..."

date every member of your audience. On the spot.

What's more, you'll never again have the cost or hassle of preparing slides. Or the boredom of presenting yet another set of dull, black and white overheads.

The 5000CX is just one of a complete line of high-performance, portable In Focus color and monochrome projection panels.

Come see a demonstration of one today.

We promise you a show you won't forget.

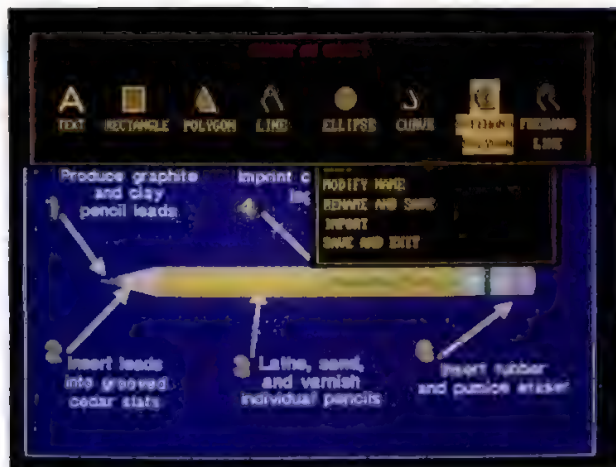
FREE OVERHEAD OFFER

For a limited time, we're giving away a free portable overhead projector with every In Focus color projection panel. It's a \$495.00 value. So call 1-800-327-7231 or in Oregon, 503-692-4968 today. And arrange to see a free demonstration.

IN FOCUS SYSTEMS® INC.

CIRCLE 272 ON READER SERVICE CARD





35mm Express produces nice-looking charts and offers a wide variety of drivers, but its interface is outdated.

an attractive program with solid functions, and it produces nice-looking output. If you need an easy-to-use presentation package that works well on a midrange machine, this one is definitely worth a look.

35mm Express Presentation Express

by Alfred Poor

Is the proverbial glass half full or half empty? Your opinion of *35mm Express* and *Presentation Express* from Business & Professional Software is likely to be colored by whether you look at what these programs can do—or what they can't. With list prices of \$495 and \$695 respectively, *35mm Express* and *Presentation Express* are closely related, with

the latter representing an extension of its less expensive stablemate's capabilities.

35mm Express first appeared in 1985. Though the product has evolved to Version 4.35, its age is showing. This is most noticeable from the first screen in the user interface, which consists of coarse-colored icons that lend a dated air to the proceedings. Matters hardly improve once you start to create your first chart. Charts are contained in "folders," each of which is a single DOS file. Hence you cannot use DOS to see what you have stored; you must go into your Express program to maneuver through this proprietary storage system.

Getting used to the different menus takes some work. There are many levels, especially in the graphic editing screen, and their organization is not always intuitive. For instance, there are several ways to align a block of text on a drawing or

chart, but all are located on different menus. Many operations require repetitive menu sequences, such as changing the color or size of some objects in a drawing, or involve many tedious key-strokes. Fortunately the program is smart enough to remember your last selection; it presents that as the default. This alone helps speed up many tasks.

35mm Express makes intelligent use of the mouse, though, and this improves things considerably. The left button is Enter and the right button is Escape, so, with a little practice, you can learn to maneuver rapidly through the many layers of menus simply by tapping buttons.

CREATING THE CHART

35mm Express does not create presentations per se; instead the folders serve as collections of charts that you can display sequentially. The first step, therefore, is to define what kind of chart you want to create. *35mm Express* offers the basic data charts, including nice-looking shadowed bar charts, and lets you create free-form drawing charts that mix text and graphics elements essentially at whim.

The program also supports simple word charts, with some limited formatting and optional bullets. You can define a range of sizes for the type on a word chart, and it will expand or contract to allow for the amount of text you have provided. Unfortunately, the package includes only nine text sizes: You do not get an infinite range of intermediate sizes with the scalable fonts.

Drawing tools are not extraordinarily easy to use, but, given time and patience, you should be able to create just about any shape you need. Creating the pencil used

PC FACT FILE



35mm Express, Version 4.35
Business & Professional Software Inc.,
139 Main St.,
Cambridge, MA 02142; 800-342-5277,
617-494-1155.

List Price: \$495

Requires: 256K RAM, hard disk, graphics adapter, DOS 2.0 or later.

In Short: Though this program does the job, it is handicapped by significant limitations in file import and presentation management, as well as an aging user interface. However, it does support an unusually wide variety of output devices.



Presentation Express can display up to 256 colors per image, and it lets you create your own custom palettes.

CIRCLE #14 ON READER SERVICE CARD

After I bombed with dBase, I almost gave up automating our office...

...but after a few hours with Alpha FOUR, I had a fully operational application!

At our Monday morning staff meeting, I announced I was going to automate our sales tracking and invoicing system later that day.

Skepticism ran high. "Paul, you promised me an application like that two years ago," said Marge. "You couldn't do it, and neither could that dBASE programmer you hired. It'll never happen!"

I'd already tried three times before to program a database: first with dBASE (much too complicated). Then I tried Q&A (not powerful enough). Then I bought Paradox (just like dBASE). They were all either too complicated, or not capable enough for our needs.

This time, I was confident. Why? Because I just bought Alpha Four, the relational database for non-programmers like me.

I knew within hours, I'd be able to build a fully relational customer tracking and billing system, complete with custom menus, beautiful screens and extensive help messages for error-free data entry.

And that's exactly what I did. You should have seen Marge's face when the first, perfectly formatted invoice came off the printer.

I DEVELOPED MY APPLICATION & REPORTS IN MINUTES

With the "application outliner," I automatically set up a system of menus, sub-menus,

and procedures based on the outline I laid out.

Alpha Four's report writer was even more impressive. I "painted" reports and invoices on-screen. They looked exactly like I wanted them to—much better than our old paper forms. I always ran out of power with other simple-to-use databases; they weren't relational. With Alpha Four, I created different databases for customers, invoices and inventory and then related them into a "set," just by drawing on-screen, a diagram of the links between the databases.

I'LL NEVER KEY IN DATA TWICE AGAIN

Now, we never have to enter the same information more than once. New invoices can be generated for existing customers without having to re-enter their information—we just "look it up" in our customer database.

And I was delighted that Alpha Four is totally compatible with dBASE .dbf files. Our mailing list went right into the new application without even having to convert the files!

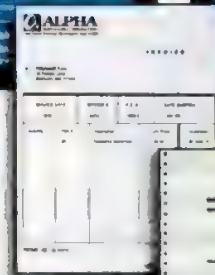
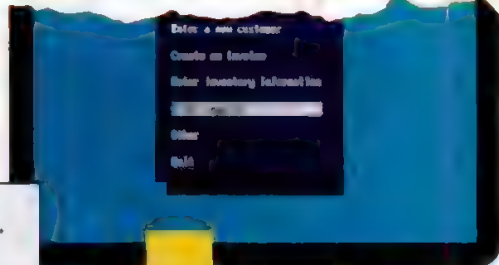
FASTER, MORE ACCURATE DATA ENTRY

When you enter data, you can automatically change the case of letters from lower to upper. You can display data entry templates for formatted fields like phone numbers, or skip over fields when certain conditions are met. Of course, all calculations are performed automatically.

Look-ups are super flexible. You can display information from a look-up database in a multi-column window anywhere on the screen. Select from the window and Alpha Four automatically fills in the related information.

*Qualifying packages include: programming databases (dBASE® II, III, and IV, Paradox, Clipper®, Foxbase®, Fox Pro®, Revelation, etc.), flat-file databases (Q&A®, PFS Professional File®, Rapid File®, etc.), integrated packages (Microsoft Works®, PFS:First Choice®, Lotus Works®, etc.), and mailing list managers (Fastpack Mail, etc.) or spreadsheets with databases (Lotus 1-2-3®, Quattro Pro®).

All trademarks are registered with the appropriate companies.



SAVE \$450 WITH THIS AD!
Special \$99 Offer: Upgrade From Your Existing Data Manager*

If you already have any database software, integrated package or mail list manager, or if you are currently

using your spreadsheet to manage data, you can upgrade to Alpha Four for just \$99.

NO RISK OFFER!

If you're not satisfied, return Alpha Four within 60 days for a full refund. This is a limited-time, one-copy-per-organization offer. So order today!

HOW TO ORDER

Mail the coupon below to Alpha Software or take it to Egghead Discount Software, Soft Warehouse, or your local dealer to pick up your Alpha Four Upgrade Package. Remember to bring proof you have an existing qualifying product.*

For Fastest Service Call: 1-800-852-5750, Ext. 117
Orders Only Hotline: 1-800-336-6644 Or Fax the order form to: 1-617-272-4876. Or mail to: Alpha Software Corporation, One North Avenue, Burlington, MA 01803.

In Canada Call: 1-800-451-1018, Ext. 177. Or fax your order to: 1-416-365-1024. Or mail coupon to: Alpha Software Corp. 626 King Street, Suite 301, Toronto, Ontario M5V 1M7.

Alpha FOUR \$99 Upgrade Offer

(Suggested Retail Price \$549)



One North Ave., Burlington, MA 01803
1-800-852-5750, Ext. 117
Orders Only Hotline: 1-800-336-6644

Yes! Please send me the Alpha Four relational database for non-programmers for just \$99 (SRP: \$549), plus \$8.50 shipping and handling. I understand it is fully guaranteed and I may return it within 60 days for a full refund. I have enclosed the cover page of my existing qualifying product* manual (or original diskette).

Method of Payment (MA residents, add 5% sales tax)

☐ Check Enclosed ☐ Charge my: ☐ MC ☐ Visa ☐ AMEX

Card # _____ Exp. _____

Name _____

Address _____

City, State, Zip _____

Daytime Phone _____

(In case we have questions about your order)

Diskette Size Select one: ☐ 3-1/2" ☐ 5-1/4"

Offer subject to change without notification

CIRCLE 233 ON READER SERVICE CARD

"RUNS RINGS 'ROUND
dBASE"

"BEST BUY"

"EXCELLENT
VALUE"

"RATED #1
WEEK"

in our test images, for example, was quite simple using just the basic geometric shapes and drawing tools. The program has a zoom feature to help you get a closer look at the finer details, and a simple CGM import facility makes it a snap to bring in pictures from outside.

NOT-SO-FINE TUNING

With just a little practice, you can quickly create most of the charts that you are

likely to want. But fine-tuning the details can be a sticky process. Want clip art on a pie chart or a column of text next to a bar chart? How about putting a line chart and a stacked bar chart on the same screen? You can do everything you want, but not without some tinkering.

There are two ways to create complex slides. The first is to convert your chart to

Suitability to Task

35mm Express

	Word charts	1			
	Data charts		2		
	Pictures and diagrams		2		
	Technical charts				
	Business presentations	1			

a drawing, then manipulate the separate elements. Since you can group objects, it's fairly easy to keep the parts of, say, a pie chart together as you drag them around. The drawback of this approach is that your chart becomes disconnected from the data when you convert it to a drawing.

The other option is to join separate charts together. In this case, they are all displayed together, as if they were created on transparent overlays and stacked on top of one another. This works fairly well, but means that you have to design charts to fit in either the left or the right half of the screen so that the two pieces don't overlap when you join them. Fortunately all the layers are displayed at one time during editing, so you can rearrange parts that cover each other.

One severe limitation is the program's dearth of import capabilities. It cannot import data directly from Lotus worksheets; instead, it generates a chart from the Lotus graph settings in the worksheet

New Low Cost Multimedia Product Family



Add multimedia to your PC

Run under MS Windows 3.0, HP NewWave, or MS DOS

Powerful new silicon offers unbeatable functionality at super, low prices

Super VideoWindows – \$695

Display full motion video in a window on VGA monitor. Scale, crop, zoom, freeze. Image capture, save and restore. Sound control. Accepts VGA input for graphics/text overlay.

Super VGA Daughter – \$395

Industry standard VGA (Headland's Video 7) attaches to Super VideoWindows for compact 1-slot solution of graphics/text overlay. 1MB buffer.

Super TV Tuner – \$395

Computer selectable antenna or 122 channel cable TV input. Combine with Super VideoWindows to watch TV on PC.

Super Still-Frame Compression – \$995

JPEG compression up to 75:1 of color or gray-scale images. Takes only seconds. All TGA file formats—TARGA 16, 24, and 32.

Celebrating Our 10th Year



New Media Graphics Corp.
780 Boston Road
Billerica, MA 01821

TEL: 508/663-0666
FAX: 508/663-6678

Order Now: 1-800-288-2207 VISA, M/C, and AMEX accepted.

CIRCLE 351 ON READER SERVICE CARD

FACT FILE

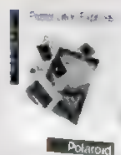


Presentation Express, Version 1.0

Business & Professional Software Inc., 139 Main St., Cambridge, MA 02142; 800-342-5277, 617-494-1155.
List Price: \$695

Requires: 640K RAM, hard disk, EGA or VGA graphics adapter, DOS 3.1 or later.

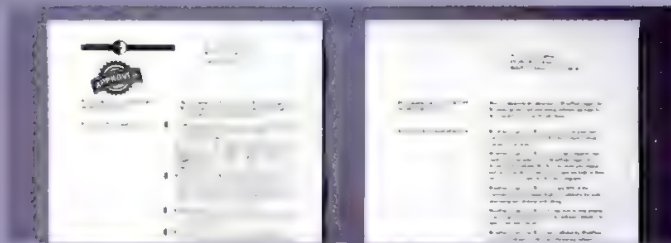
In Short: *Presentation Express* has a few advantages over its less expensive cousin in color handling, but it shares some of its deficiencies as well. Its high price doesn't buy you much over its competitors.



CIRCLE 413 ON READER SERVICE CARD

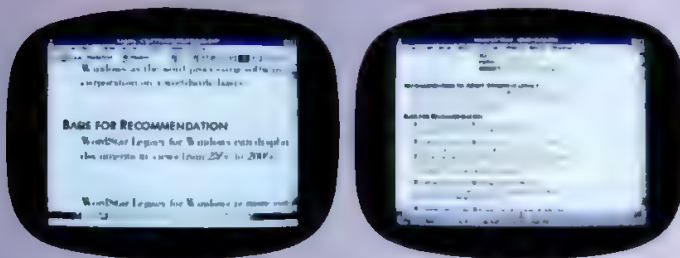
OUR WINDOWS ARE BEYOND WORD'S.

WordStar® Legacy™ vs. Microsoft® Word.



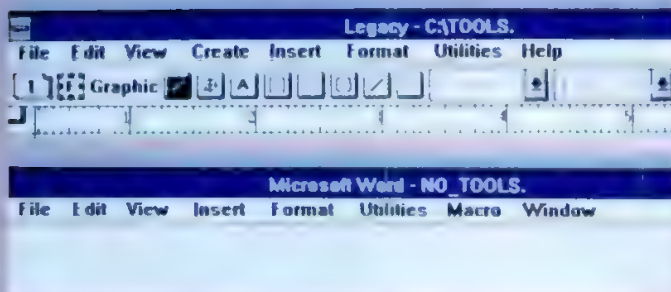
WordStar Legacy is a high end word processor with advanced page layout features. Place text and graphics exactly where you want them.

WordStar Legacy vs. Microsoft Word.



Magnify or reduce multiple, single, fractional pages from 25 to 200%. Edit text, layout or graphics at any magnification.

WordStar Legacy vs. Microsoft Word.



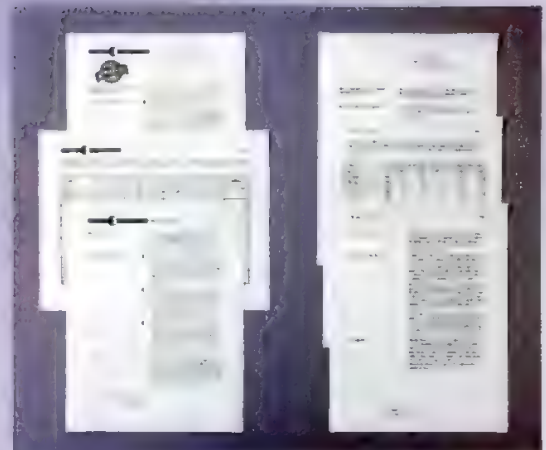
Import nearly every major PC graphics file format. Create, even edit imported object graphics, with built-in Micrografx® tools.

WordStar Legacy vs. Microsoft Word.

Alike Alike

Not all alikes are alike. Now you can kern letters manually or automatically. And specify type sizes in 1/10 point increments between 1 and 792 points.

WordStar Legacy vs. Microsoft Word.



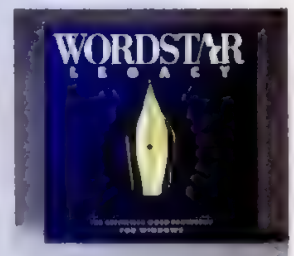
Mix portrait and landscape pages in the same document. And flow text and tables across pages and columns.

WordStar Legacy is the definitive word processor for Windows. Combining high-end word processing tools with advanced page layout and graphics in one easy to use program, it gives you the ability to create compelling documents.

Because WordStar Legacy is a single program, it's less expensive than buying separate DTP and WP applications, training and support costs are less, and its superior integration, DDE™, and innovative tools make producing complex documents easy and cost effective.

Speaking of cost, you can upgrade to WordStar Legacy from your current word processor for a limited time for \$129. Call 1-800-227-5609 now. And find out why documents created in WordStar Legacy aren't just beyond Word's.

They're beyond words.



file. Nor can you import text for word charts. The bottom line is that if you want it on your chart, you'll probably have to key it in yourself.

ONE MORE, WITH A TWIST

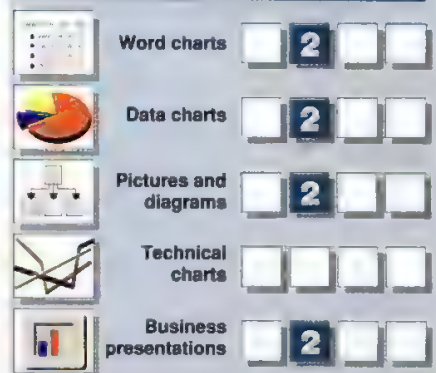
Presentation Express is similar to *35mm Express* in its basic workings but offers a few significant enhancements for the extra \$200, including much-improved color handling. While *35mm Express* offers only

GRAPHICS PRESENTATION GRAPHICS

a single fixed-color palette of 64 colors, *Presentation Express* offers 256 colors, letting you mix your own colors and store custom palettes. And whereas *35mm Express* supports gradient backgrounds only as a function of certain film recorders, *Presentation Express* lets you define top-to-bottom gradients within the program so that you can see a dithered representa-

Suitability to Task

Presentation Express



tion right on the screen.

Presentation Express also comes with more word chart formats, including outlines and multicolumn charts. It adds CG Times, CG Triumvirate, and ITC Bookman Medium to *35mm*'s skimpy typeface repertoire (Swiss), improving the text quality and supplying some refreshing variety. Finally, it makes it easier to get elements into your charts. Instead of relying on just a single-image clipboard buffer for copying chart elements and clip art, it adds a "scrapbook" in which you can store dozens of small picture elements accessible right from the drawing screen; you don't have to leave your work in progress. A forthcoming version of *Presentation Express* is expected to let you import both Lotus worksheet data and ASCII text.

OUTPUT ADVANTAGE

One place that *35mm Express* still has an edge over *Presentation Express* is in its collection of output drivers. If there is a film recorder, slide service, color printer, or other device, no matter how obscure, that you want to use, chances are excellent that a driver for it is yours for the asking from Business & Professional Software. Both programs support MAGICorp's slide service via modem, so it's easy to get slides or transparencies. You should note, however, that their screen-show facilities are rudimentary at best, and they have no provision for adding speaker's notes to printouts.

Both programs produce nice-looking output; both make frugal use of system resources. But getting what you want requires a willingness to adapt to their limitations. There are better choices on the market. ■

SX/NOW!™

Upgrade IBM PS/2 Models 50 & 60

Faster than a 55SX at less than 1/4 the cost!

Performance Ratings	PS/2 Model 50 or 60	A New PS/2 Model 55SX	SX/NOW!™ in your 50 or 60	
			16 MHz	20 MHz
Norton SI	9.8	15.3	17.6	21.5
Landmark	9.8	15.1	23.2	27.8
Dhrystones	1842	2986	3250	3584
Whetstones	36.9 K	58.9 K	69.0 K	83.4 K
Incremental Cost	—	\$3,895	\$895	\$995

80386SX 16 & 20 MHz processor Upgrades from Kingston features:

- ▶ 16 Kbytes of Cache Memory
- ▶ Onboard 16 or 20 MHz Processor Clock
- ▶ Requires NO Expansion Slot
- ▶ 80387SX Math Co-Processor Socket

NEW MEMORY PRODUCTS
PS/2 Model 90 & 95
IBM RS/6000
TOSHIBA 2000SX

Call Sigma for Your Upgrade Options.

Σ Sigma Data

P.O. Box 1790 Tel: 800-446-4525
New London, NH 03257 Fax: 603-526-6915

5-Year Warranty and 30-day Money Back Guarantee.
VISA, MC, AMEX, COD and Qualified PO's accepted.

All products & company names are trademarks or registered trademarks of their respective companies.

Upgrade today!!! Call...
1-800-446-4525
Profit from 10 years of experience

CIRCLE 160 ON READER SERVICE CARD

CIRCLE 729 ON READER SERVICE CARD

**THE FOLLOWING PRICES
MAY BE SO SURPRISING,
YOU'LL PROBABLY WANT
TO SIT DOWN.
NEAR A PHONE.**

Tandon Computers cost a lot less than other computers. Here's the surprising part. Tandon Computers also come fully loaded with a number of standard features you won't find on most other machines.

And we didn't stop there. With any Tandon Computer, you also get the support you'd expect from a \$400 million company with fifteen years of manufacturing and design experience. Like prompt delivery, a one year limited warranty, on site service, and helpful toll-free tech support. We even offer a special leasing program. And if for any reason you're not pleased, you get a full refund within the first 30 days.

So if you want a great computer at a great price, why not give Tandon a call right now. After all, you're already sitting next to the phone.

Tandon

TO ORDER DIRECT, CALL NOW:

800-800-8850

FAX 805-529-8408



Tandon LT/386sx Laptop

\$2,499

LEASE: AS LOW AS \$143/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel® 80386SX running at 16 MHz. Supports optional 80387SX math coprocessor.
Memory: 1MB standard.
Storage: 1.44MB diskette drive, 40MB IDE hard drive. (Upgradeable to 100MB).
Video: Dual panel EL backlit VGA LCD. Supports external monitor.
Order now and receive a WorldPort Pocket Modem (\$359 Value) at no charge.



Tandon NB/386sx Notebook

\$3,495

LEASE: AS LOW AS \$123/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80386SX running at 20 MHz. Supports optional 80387SX math coprocessor.
Memory: 2MB standard.
Storage: 1.44MB diskette drive, 30MB IDE hard drive.
Video: Paper white VGA, non-glare CCFT backlit LCD, 32 grey shades. Supports external monitor.
Call for information on our 60MB hard drive model.



Tandon SL 386sx/20 Slimline

\$1,999

LEASE: AS LOW AS \$114/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80386SX running at 20 MHz. Supports 80387SX math coprocessor.
Memory: 1MB standard.
Storage: 1.2MB OR 1.44MB diskette drive, 40MB IDE hard drive.
Video: VGA monochrome display.



Tandon SL 486/25 Slimline

\$2,999

LEASE: AS LOW AS \$165/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80486 running at 25 MHz.
Memory: 2MB standard.
Storage: 1.2MB OR 1.44MB diskette drive.
Video: VGA monochrome display.
Call for information on our SL 486 Upgrade Package and additional options.



Tandon 386sx/N Network Station

\$1,199

LEASE: AS LOW AS \$69/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80386SX running at 16 MHz. Supports 80387SX math coprocessor.
Memory: 1MB standard.
Video: VGA monochrome display.
Options: 1.44MB diskette drive, 40MB IDE hard drive. Additional options available. Please call for details.
Call for information on our 286/N Low Profile, Network Station, starting at \$949.



Tandon 386/33 Desktop

\$3,399

LEASE: AS LOW AS \$112/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80386 running at 33 MHz. Supports 80387 or Weitek™ 3167 math coprocessors.
Memory: 4MB standard.
Storage: 1.2MB OR 1.44MB diskette drive, 110MB IDE hard drive.
Video: VGA monochrome display.
Call for information on our 386/25 Desktop.



Tandon 486/33 EISA Desktop

\$7,299

LEASE: AS LOW AS \$183/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80486 running at 33 MHz. Supports Weitek 4167 math coprocessor.
Memory: 4MB standard.
Storage: 1.2MB OR 1.44MB diskette drive, 200MB IDE hard drive. EISA caching SCSI controller available.
Video: VGA monochrome display.



Tandon Tower 486/33 EISA

\$7,699

LEASE: AS LOW AS \$190/MONTH.

STANDARD CONFIGURATION

Microprocessor and Main Board: Intel 80486 running at 33 MHz. Supports Weitek 4167 math coprocessor.
Memory: 4MB standard.
Storage: 1.2MB AND 1.44MB diskette drives, 200MB IDE hard drive. EISA caching SCSI controller available.
Video: VGA monochrome display.

Tandon Tower 386/33

\$4,399

LEASE: AS LOW AS \$121/MONTH.

Call for additional specifications.

ATTENTION:

We have a special offer so big it won't fit on this page.
 To find out what it is, call us toll-free at 800-800-8850.

- 30-Day Money Back Guarantee
- 1-Year Limited Warranty
- 24 Hour Toll-Free, On Call Technical Support
- On-Site Service

OPTIONS AND CUSTOM CONFIGURATIONS

- Hard Drives, Diskette and Optical Drives
- Modems
- Memory Expansion
- Coprocessors
- VGA and Super VGA Monitors
- Additional Options Available On All Systems. Please Call.

Dimensions: 7.5 x 9.75 x .25"

\$2.49

No leasing plan available.

COMPOSITION

Multiple, non-glare,
paper-white screens

Speed: 20 wpm

200 pages of
non-expandable memory

WE FOUND A NOTEBOOK THAN THE NEW 20 M WE'RE STILL LOOKING FOR O

As you can see, there are few notebooks more affordable than the new 20 MHz Tandon NB/386sx. That's because our new notebook's only \$3,495, a price thousands of dollars less than most other computers in its class. And in addition to great savings, you get a superior, full-functioning computer with standard features that are options on most other notebooks.

The ready-to-go Tandon NB/386sx boasts the 20 MHz Intel® 80386SX processor, the highest level of power you can get in a battery-powered notebook today. But that's just for starters. You also get a 30MB IDE hard drive and a 3.5" internal floppy drive, 2 MBs of memory expandable to a whopping 16MBs, and three hours of battery life. Not bad for a 6.5 lb. machine small enough to fit on this page.

The NB/386sx is extremely versatile, too. It has one parallel port and two serial ports. So you can plug into a large combination of devices like a printer, mouse, graphic tablet, or modem. At the office, you can connect up to an external monitor and keyboard, or even communicate with your

company's larger computers.

And while the Tandon notebook may be extremely small, its extra large 9 inch, non-glare VGA display makes even the most complex graphics easy to read. The paper-white screen, specially designed to reduce eye strain, provides a sharp, bright image using triple super twist LCD technology.

Of course, with any Tandon Computer you also get the support you expect from a \$400 million corporation. Prompt delivery, a one year limited warranty, and helpful toll-free tech support. We even offer a special leasing program. And if for any reason you're not pleased, you get a full refund within the first 30 days.

So if you're interested in a great little portable computer with desktop performance, call us today about the new Tandon NB/386sx or the Tandon NB/386sx, Model 60 with a 60MB hard drive, for only \$3,995.

There are other ways to save thousands of dollars on a notebook, but just none quite as practical.

**IMMEDIATE
DELIVERY
AVAILABLE.**

Dimensions: 8.5 x 11 x 2.1"

\$3,495

Lease: As low as \$123/month

Non-glare, paper-white
VGA screen

Speed: 20 MHz

2 MBs of memory
expandable to 16 MBs

**K WITH A BETTER PRICE
Hz TANDON NB/386sx.
NE WITH BETTER FEATURES.**

**"Tandon moves to the head of the class
when you compare Notebook features you
get for the dollars spent."**

Byte, March 1991

	Tandon NB 386sx/20	Compaq LTE 386sx/20	T.I. Travelmate 3000
Max RAM	16MB	10MB	6MB
Base RAM	2MB	2MB	2MB
Hard Drive	30MB	30MB	20MB
Hard Drive Option	60MB	60MB	40/60MB
Screen	VGA	VGA	VGA
Dimensions	8.5"D x 11"L x 2.1"H	8.5"D x 11"L x 2.2"H	8.5"D x 11"L x 1.8"H
Weight	6.5 lb.	7.5 lb.	5.7 lb.
Price	\$3,495.00	\$6,499.00*	\$5,499.00*

*List prices published by Hard Facts, Beverly, M.A., January, 1991
Actual dealer prices may vary.

- 30-Day Money Back Guarantee
- 1-Year Limited Warranty
- 24 Hour Toll-Free, On Call Technical Support
- Leasing Program Available

Tandon

TO ORDER DIRECT, CALL NOW:

800-800-8850

FAX 805-529-8408

Tandon reserves the right to amend specifications without notice. Tandon 486, Tandon 386, SL386sx, SL 486, LT/286, LT/386sx, 386sx/N, 286/N, NB/386sx Tandon Tower 386, Tandon Tower 486, PowerPoster, MultiCACHE and MMAT are trademarks of Tandon Corporation. Intel is a registered trademark of Intel Corporation. All other products or services are identified by the trademarks or service marks of their respective companies. Lease terms vary by system.
© 1991 Tandon Corporation, Moorpark, CA.

CIRCLE 508 ON READER SERVICE CARD



THE FIRST 486 WIT

You no longer need the budget for a 486[™] computer in order to own one, thanks to the Tandon SL 486/25 Slimline.

That's because the SL 486/25 costs just \$2,999, thousands of dollars less than most other 486's. But more than that, Tandon's the first to offer a 486 at a 386[™] price that includes exclusive Tandon features, as well as the quality that comes from fifteen years of industry experience and an engineer-design team with 16 patents to their credit. That's why the SL 486 is more than just a great buy, it's a great machine.

To start with, we used the Intel® 80486 chip with its built-in numeric coprocessor and 8k memory cache. The cache provides faster memory reads and the coprocessor handles even the most difficult calculations with the utmost speed.

Then, to help maintain the power of a big machine in a little package, we designed it with a Tandon exclusive called the PowerPoster[™]. It's an intelligent write buffer that accelerates most write operations to RAM at four times the rate of un-enhanced 486's.

To empower this slimline even more, we incorporated another Tandon feature. Our exclusive MIAT[™] (Mapper-Integrated AT) chip for greater interpretation and reliability. Then we added the Tandon Memory Mapper, which provides Flex Shadowing of

RAM for faster processor performance. Together, these innovations help to give you one fast machine in one attractive slim case for one really low price.

Of course, with any Tandon Computer you also get the support you'd expect from a 400 million dollar corporation. Like prompt delivery, a one year limited warranty, on-site service, and helpful toll free tech support. We even offer a special leasing pro-

gram. And if for any reason you're not pleased, you can get a full refund within the first 30 days.

So if you're interested in a high powered, compact, 486 machine that costs about the same as most 386's, call us today and ask about the Tandon SL 486/25 Slimline. Its performance will truly impress you, almost as much as its price.

- 30-Day Money Back Guarantee
- Toll-Free Technical Support
- 1-Year Limited Warranty
- On-Site Service



Tandon SL 486/25 Slimline
SPECIAL OFFER:

\$2,999

Lease: As low as \$105/month.

H A 386 PRICE TAG.

THE TANDON UPGRADE PACKAGE OFFER*

AVAILABLE FOR JUST \$1000.
Includes: 110MB Hard Drive
VGA Color Monitor (640x480 Resolution)
Microsoft® Windows™ 3.0/Mouse

OPTIONS AND CUSTOM CONFIGURATIONS

- Hard Drives, Diskette and Optical Drives
- VGA and Super VGA Monitors.
- Modems
- Additional Options Available On All Systems. Please Call.
- Memory Expansion
- Coprocessors

Tandon SL 486/25: \$2,999 • Price includes: system unit, 2MB RAM, 1.2 or 1.44MB diskette drive, VGA monochrome monitor, 16-bit video card, keyboard, power cord, Tandon MS-DOS software and manual, operating and installation manual. • **Options:** 1MB or 2MB memory upgrade kits; additional 1.2MB and 1.44MB diskette drives; 110MB or 200MB IDE hard disk drives; VGA and Super VGA color monitors, 2400 baud modems, network cards, laser printers, Microsoft® Windows™ 3.0 and serial mouse. Additional options and features are available. *Available only with Tandon SL 486/25 systems. **Call for details on our family of Slimline computers.**

CIRCLE 744 ON READER SERVICE CARD

Tandon

TO ORDER DIRECT, CALL NOW:

800-800-8850

FAX 805-529-8408

Tandon reserves the right to amend specifications without notice. Tandon 486, Tandon 386, SL386, SL 486, LT/286, LT/386, 386s/N, 286/N, Tandon Tower 386, Tandon Tower 486, PowerPostor, MultiCACHE and MIAT are trademarks of Tandon Corporation. Intel is a registered trademark and 486 and 386 are trademarks of Intel Corporation. All other products or services are identified by the trademarks or service marks of their respective companies. ©1991 Tandon Corporation, Moorpark, CA. Leasing terms vary by system.



SNIP SNIP HERE.

After trimming the size of our Desktop 386 personal computer, we did the same to its price. The result is the Tandon SL 386sx/20 Slimline.

And although it's a compact machine, we've made sure it can still pack a wallop. We use the Intel® 80386SX chip with full 32 bit internal processing power, so it will run all of your existing applications faster. And its 386 instruction set lets you take full advantage of advanced multitasking software and applications. Not bad for a machine just five inches tall.

But we didn't stop there. To supply you with a higher level of systems integration we also gave this sleek package our proprietary MIAT™ (Mapper-Integrated AT) chip. So you get a reduced chip count as well as increased reliability.

And finally, we design and engineer all of our own systems. This results in outstanding features like a built-in diskette drive and hard disk controllers on the mainboard. You also get two serial ports and one parallel port.

- 30-Day Money Back Guarantee
- 24 Hour Toll-Free, On Call Technical Support
- 1-Year Limited Warranty
- On-Site Service

Of course, with any Tandon computer you get the support you'd expect from a company with over 15 years of experience. Like helpful 24 hour, on call technical support. On site service, if you ever need it. A one year limited warranty. A 30 day no questions asked, full refund policy. Even a special leasing program.

So, if you're interested in a high powered, low profile computer at an outstanding price, call us today about our Tandon SL 386sx/20 Slimline. Or for even more power, ask about our SL 486/25 Slimline. Both are proof it doesn't always take a lot of machine to get a lot of machine.

Tandon SL 386sx/20

Now
\$1,999

Lease: As low as \$114/month.

SNIP SNIP THERE.

Tandon SL 386sx/20 • Price includes system unit, 1MB RAM, 40MB IDE hard drive, 1.2 or 1.44MB diskette drive, VGA monochrome monitor, 16-bit video card, keyboard, power cord, operating and installation manual. • **Options:** 1MB and 2MB memory upgrade kits; Microsoft® Windows™ 3.0 and serial/bus mouse; additional 1.2MB and 1.44MB diskette drives; 110MB or 200MB IDE hard disk drives; VGA and Super VGA color monitors, 80387SX math coprocessor, 2400 baud modems, network cards, laser printers, Tandon MS-DOS software and manuals. **Tandon SL 486/25:** Now, \$2999 Special Price Offer includes: system unit, 2MB RAM, 1.2 or 1.44MB diskette drive, VGA monochrome monitor, 16-bit video card, keyboard, power cord, Tandon MS-DOS software and manual, operating and installation manual. • **Options:** 1MB or 2MB memory upgrade kits; additional 1.2MB and 1.44MB diskette drives; 110MB or 200MB IDE hard disk drives; VGA and Super VGA color monitors, 2400 baud modems, network cards, laser printers, Microsoft® Windows™ 3.0 and serial mouse. Additional options and features are available. **Call for details on the SL 486/25 "Upgrade Package Offer".**

OPTIONS AND CUSTOM CONFIGURATIONS

- | | |
|--|---|
| • Hard Drives, Diskette and Optical Drives | • VGA and Super VGA Monitors. |
| • Modems | • Additional Options Available On All Systems. Please Call. |
| • Memory Expansion | |
| • Coprocessors | |

Tandon

TO ORDER DIRECT, CALL NOW:

800-800-8850

FAX 805-529-8408

Tandon reserves the right to amend specifications without notice. Tandon 486, Tandon 386, SL386sx, SL 486, LT/286, LT/386sx, 386sx/N, 286/N, Tandon Tower 386, Tandon Tower 486, PowerPoster, MultiCACHE and MMAT are trademarks of Tandon Corporation. Intel is a registered trademark of Intel Corporation. All other products or services are identified by the trademarks or service marks of their respective companies. ©1990 Tandon Corporation, Moorpark, CA.

CIRCLE 333 ON READER SERVICE CARD



HyperHistory.



Actual unretouched photographs of PLUS programming on Macintosh, Windows 3.0 and OS/2 Presentation Manager platforms.

HyperPower.

Corporate information management will never be the same. Because now Spinnaker PLUS™ 2.0 lets you create powerful, graphically intuitive applications that look and run identically on Macs and PCs running Windows 3.0 or OS/2 Presentation Manager. So nothing gets between users and the information they need - not even different operating systems. That's HyperPower™.

Develop your application just once on a Mac or PC, and it's available to everyone via disk or network file sharing. You can even import and enhance existing HyperCard™ stacks.

PLUS provides the only hyperprogramming environment that gives you so much power and flexibility. A robust Object-Oriented Programming language with a hefty selection of paint, draw, word processing and database objects. Pull-down menus with commands you can insert into a script with a click of the mouse. Run/edit toggling that lets you debug as you develop.

PLUS applications are infinitely expandable with Software Slots™ that let you create new object classes such as spreadsheets or communication links, and integrate applications or hardware for audio, video or communications.

Add report generators, SQL database links or other companion products for even more HyperPower.

With PLUS, you can create a whole new generation of easy-to-use corporate information management applications: executive information systems, interactive sales training, online catalogs, dazzling multimedia presentations - there's no limit.

For more information and details on how you can obtain a free demo copy of PLUS 2.0, call

1-800-445-7899

SPINNAKER



Spinnaker PLUS 2.0. The Object Is Information.

Spinnaker Software, 201 Broadway, Cambridge, MA 02139
HyperCard is a trademark of Apple Computer Corp.

CIRCLE 181 ON READER SERVICE CARD



Clip Art

by Luisa Simone

**Looking for just the right
embellishment for your
presentation or publication?**

**You should be able to
find it in one of these 18
libraries of clip art. Best of all,**

**if a picture isn't quite what
you want, you can change it:**

**All of these images come in
EPS, CGM, or some other
editable vector format.**

Though you may think of clip art solely as a way for artless business users to spice up their documents and presentations, even professionals use clip art. When deadline pressure peaks—or inspiration wanes—a collection of stock illustrations can save the day. Yet electronic clip art, like its paper predecessors, requires some type of manipulation to avoid the number-one pitfall of prepackaged images: art that isn't germane to your document or presentation. And your ability to manipulate an image is limited by the capabilities of its file format.

In the past, clip art often came in bitmapped formats like .PCX and TIFF, which worked well if you intended only to crop, place, or recolor the picture. Other modifications yielded a host of attendant problems. Bitmapped images don't respond well to resizing, for example, because the individual dots that comprise the file become too large to maintain the integrity of the image. This effect, which is called pixellation, has a corollary in other editing functions. Skewing and rotation, for instance, tend to result in the classic staircase (or aliased) effect along the edges of a picture. Simply stated, the traditional piece of clip art—a 300-dpi black-and-white bitmapped drawing—just doesn't cut it anymore.

Only editable vector formats give you real flexibility when modifying a picture. In contrast to bitmapped files, vector files contain descriptions of objects, such as lines and arcs, that in combination form the picture. Not only can you assign different attributes to the objects, thus changing the colors or varying the line or border widths, but you can reshape the outlines of the objects themselves. You can break images apart into their constituent objects and rearrange the pieces. You can resize, rotate, flip, and skew vector images without any loss in quality.

Vector images are ideal for users who need to produce high-quality images on a number of different output devices. Vector images are device and resolution independent and will appear at the highest resolution of which the output device is capable. If your application program is connected to a laser printer, for example, your vector images will print at 300 dots per inch. But the same images can be sent to a high-resolution typesetter to print at 1,270 dots per inch or to a film recorder to be imaged at 2,000 or 4,000 lines. By the same token, if the clip art in question contains RGB color information and gradient fills, an image that looks acceptable on a 16-color dithered VGA screen will look better on a 256-color Super VGA screen—and positively spectacular on a film recorder or color PostScript printer.

Bitmaps are indispensable for scanned photographs. But gray-scale or color-capable scanners (or even Kodak's announced analog-to-digital processing service) and a 35-mm. camera obviate the need for stock photographic images. Why buy generic clip-art photographs when you can digitize your own with relative ease? High-quality pictures must be either

8-bit gray-scale or 24-bit color, and the downside of these admittedly beautiful .TGA and TIFF 5.0 images is that their files are huge. Though bitmaps can work well as inset photographs or as backgrounds, vector is the way to go for most purposes.

AN IMAGE FOR EVERY IDEA

Though the 18 clip-art libraries reviewed in this story all come in editable vector formats and offer a good selection of images for business use, they differ in aims and emphasis. *PicturePak* and *Presentation Task Force*, for instance, are oriented to business graphics users and come in CGM format, which almost every business graphics package supports. *ImageFile* is similar, but its files are currently destined exclusively for *Lotus Freelance* and come in that program's native .DRW format. And *DrawArt Professional's* image library is available only in the GEM format.

Other libraries aspire to a higher artistic level. A few, notably *Micrografx Clip Art* and *Arts & Letters*, are sold as adjuncts to their vendors' illustration packages; hence they come only in those vendors' proprietary formats (.DRW and .GED, respectively). But the largest number come in Encapsulated PostScript (EPS) format. These include *ArtRight Image Portfolios*, *ArtWare*, *Click & Clip 500*, *ClickArt EPS*, *Clipables: The EPS Graphics Library*, *Cliptures*, *DeskTop Art*, *Digit-Art*, *Images With Impact!*, *Moonlight Artworks Collection*, *ProArt Professional Art Library*, and *Totem Color Clip Art*.

Many vendors offer clip art in more than one format in order to reach a wider audience. *Totem Color Clip Art*, for instance, is available in *CorelDRAW's* proprietary .CDR format as well as in EPS. And *ArtRight Image Portfolios* are available in CGM, GEM, and two proprietary formats—Micrografx .DRW and *CorelDRAW's* .CDR—as well as EPS.

TO EDIT, OR NOT TO EDIT

It's no surprise that the PostScript bandwagon is carrying such a full load of passengers. The EPS format, compatible with a wide array of professional graphics programs, offers the advantage of a rich array of high-level object descriptors such as Bezier curves, making it possible to describe complex images easily and economically. But not all EPS files are meant

to be edited, so don't rush out to buy an EPS clip-art library until you've ascertained what kind of files are in it.

In some cases, the .EPS extension denotes a file that is merely passed along to a PostScript printer or typesetter. These types of files are device independent; they can be imported into documents and placed, scaled, or rotated at will. But the objects that comprise the image remain untouchable by the importing application. In fact, in most cases, all that you will see on screen is a gray box indicating where the image will eventually print, though sometimes these files come with a low-resolution bitmapped facsimile of the image (usually in TIFF format) attached to help in positioning.

The EPS format you want is actually a restricted subset of PostScript that can be interpreted by applications. Inaugurated by *Adobe Illustrator* on the Macintosh, this "editable EPS format" (also called the .AI format, after the extension used by *Adobe Illustrator*) can be viewed on-screen in the form of objects. These objects can be extensively modified, as can other vector formats. The *Illustrator* format isn't as rich as PostScript; only by

OUR CONTRIBUTORS

Luisa Simone is a contributing editor of PC Magazine.

Paul Murphy is a partner in *Singer-Murphy Associates*, a New Jersey-based surveying firm, and a sysop on PC MagNet.

David Foster, Michael Graham, Gary Kaplow, and Rob Smith are members of the PC Magazine art department.

Kellyn S. Betts is a New York-based freelance writer and a frequent contributor to PC Magazine.

David Dean, a Ph.D. candidate in anthropology at the City University of New York Graduate School, writes a monthly column on fonts for PC Publishing magazine.

James Karney is a computer and information systems consultant based in Clinton, Tennessee, and the author of books on *CorelDRAW* and other topics.

restricting the number of operators in a file is it possible for the importing application to act as a pseudo-PostScript interpreter and translate the PostScript code into a native format. So, for instance, ellipses per se don't exist in an editable EPS file; circles and their less-perfect cousins are composed of four arcs instead, which means they can be imported into applications that don't understand circles.

IMPORT AND EXPORT

Many business graphics programs don't import EPS files, however. In these cases, CGM format is more widely useful. Just about all programs, not just professional drawing programs, can import CGM files, and almost every graphics application can export charts and images in this format. The downside is that CGM has very significant limitations. For one thing, it does not support complex entities like gradient fills and Bezier curves, so images have to be simulated less efficiently as collections of lines and polygons. The main problem with CGM, though, is that the specification has such loose parameters and has been tweaked by so many different vendors that incompatibilities often arise between the different "flavors" of CGM created by different packages.

Fill patterns, for instance, may be supported by one program but are unknown to another. File headers may be formatted slightly differently, resulting in distortions in size or line weights. And different color-handling schemes lead to gross color distortions. Though CGM clip-art libraries are aimed at multiple applications and tend to be generic enough to work properly, ultimately the only way to tell if your graphics program will import a CGM file properly is by trial and error.

All of these limitations and difficulties have contributed to the enormous success of programs like *Arts & Letters Graphics Editor*, *CorelDRAW*, and *Micrografx Designer*. These products contain import and export capabilities that allow you to pull a picture in as one format and send it out in another. Encapsulated PostScript files can become CGM images, GEM images, or Windows metafiles. And in the process, you can use the drawing program's elegant tools to make modifications. At the very least, users who rely upon vector clip art also learn to rely upon vector-to-vector conversion programs (see "Object to Object: Vector File-Conversion Utilities," *PC Magazine*, January 29, 1991).

GRAPHICS VECTOR CLIP ART

A MATTER OF PERFORMANCE

The idea of testing a clip-art library might seem a bit strange at first. After all, these libraries are just collections of images. It's easy to assume that performance issues depend entirely upon the application into which you import them. But that's not the case.

The memory requirements for vector clip art increase as the number of objects and curve segments increases. Complex pictures are composed of numerous—sometimes hundreds of—objects. In addition, each object (not so obviously) is composed of a number of curves. If a simple free-form outline contains dozens of curves, the image is proba-

It's easy to assume
performance depends
entirely upon the
application into which
you import the clip art.
But that's not the case.

bly hogging memory for no good reason, and this in turn results in slower display and printing times, or even "out of memory" messages.

Object organization is another area that requires careful scrutiny. Recoloring an executive's necktie should be a simple task, but it becomes frustratingly laborious if the designer has decided to make the necktie and the left lapel, for example, one object. In that case you must first edit the outlines to create two separate objects, make sure that the outlines are closed, and only then reassign color fills. The best libraries have images with logically organized components that can be recolored in one motion.

Advanced graphics programs allow you to edit a vector image by ungrouping and grouping objects together. This essential image management tool works better when a piece of clip art contains logical groupings. So, when you import an illustration that contains three people, it is easier to move the figures around

if the objects that form each person have been grouped together. Without this small courtesy it might take a fair amount of time just to locate the stray hand that you "lost" so that you can reattach it to the correct arm.

THE TROUBLE WITH COLORS

Even the pretty colors in a clip-art image can be problematic. For example, CGM files can indicate color either by using straight RGB values or by the more common method of an indexed color palette. Conflicts arise when the palette in the CGM picture doesn't correspond to the limited palette of some application programs—most notably DOS-based presentation programs like *Harvard Graphics* and *Freelance Plus*. Watching skin tones turn green is no fun, and neither is the extra work of ungrouping the clip art to reassign colors from the active palette. In fact, you'll often find it easiest simply to start with black-and-white clip art and assign colors within the application program—provided, of course, that the picture elements are easy to select and logically constructed.

Gradient fills are another place for caution. The EPS format is able to support gradient fills, but clip-art vendors are nervous about what might happen if the application you're using doesn't know what to do with them. To ensure universal compatibility, they simulate fills using a series of closely spaced bands or concentric objects; these print just fine in most cases but they will increase the size of the file and make the gradient difficult to recolor. You can handle this drawback easily, however, by simply deleting all of the objects and inserting a gradient fill of your own.

Don't forget that something as mundane as file organization can affect your overall performance. It may take 20 minutes of shuffling floppy disks in and out of the A: drive to compensate for poorly structured subdirectories and nonsensical file-naming conventions. Though we live in an age of electronic art, most products on the market still expect you to locate the images you need by tediously flipping through a printed catalog. Only a few libraries (*Arts & Letters* and *Desktop Art*) come with software that gives you on-screen previews that can be indexed by keywords, similar to *CorelDRAW*'s Mosaic utility. The organization and clarity of the catalog makes a big difference in the usefulness of the clip-art library.

SEE FOR YOURSELF

Though the editorial staff and the reviewers here at *PC Magazine* can sort through the technical issues surrounding clip art, it's still up to you to sort through the actual images. Our reviews can give you some general feel for the aesthetic qualities of the art, but your own eyes are the best guide: Personal inspection is the only way

to find out if a clip-art library suits your needs. One of the unquantifiable aspects of a purchasing decision is the ratio of hits to misses that you are willing to live with, and we obviously can't decide that for every customer. You might feel that one perfect image justifies the purchase price

of an entire clip-art library, though economically the odds are against it.

Fortunately, shelling out a lot of money for several clip-art collections, each of which contains a few images you want, is not your only option. Micrografx, for instance, offers a custom deal where, for a one-time price of \$149.95, you can cull 100 images from among the company's

FROM STOCK CLIPS TO CUSTOM DRAWINGS: Getting the Most Out of Clip Art

by Luisa Simone

Though vector clip-art libraries give you a plentiful selection of stock illustrations and sophisticated graphics programs give you flexible editing tools, ultimately you have to supply the creativity. Before you reflexively deny any artistic talent, take a look at these guidelines and hints for editing clip art. You don't have to be a Leonardo to make memorable images.

Take a look at the two images reproduced here. Neither image can be considered a great work of art, but they make a good first step toward a company logo or a front-page illustration for a desktop-published newsletter. Both were composed using standard clip-art images and the basic editing tools found in many drawing or presentation packages (we used *CorelDRAW*).

The first illustration starts out with

two pieces of clip art that are related by content—earth and astronaut—from 3G Graphics' *Images With Impact!* library. The picture of the earth has been simply resized and recolored, but the astronaut has been resized, rotated, and cropped so that the middle of his thighs about the frame of the picture. Cropping a piece of clip art and placing it so that it pushes against the frame of a picture in this way creates an impression of movement. Here the illusion suggests that the spaceman might float away.

SLEIGHT OF HAND

Lots of differently-angled gradients create the illusion of more detail—in this drawing, gradients have been applied to the globe, the astronaut, the background, and the border that surrounds the image. Oddly angled or radial gradient fills can also make large, visually boring objects look as if their ele-

ments have been individually colored. For instance, a 230-degree angled fill was applied to the large silhouette that encompasses most of the helmet and all of the body, as well as the side portion of the oxygen tank.

This image illustrates the benefits of using a limited palette. Just because a program supports 16.7 million colors doesn't mean you have to use them. Here, an almost monochrome palette creates a particular mood. Subtle shades of yellow, green, and blue function as accents.

Deliberately allowing one or two elements to dominate a drawing is a good policy. But little details, like the perspective and shadow effects that have been added to the headline, make this image more interesting—an effect that can hold an audience's attention for a few extra seconds during a presentation.



In our first example, a stock globe and astronaut have been cropped to suggest weightlessness. Small details of coloring and other effects unify the images and make them more interesting.



**INSTANT
ACCESS**

Flat, bright colors and emphasized lines give a clean simple look to this logo, which uses symbols of time and geography to represent the abstract concept of instant access.

various clip-art collections. There are certain limitations to this offer—you aren't allowed to choose pictures from the Special Edition Libraries, for example—but it is a genuinely useful courtesy that Micrografx offers to its customer by sharing its clip-art collections with Applied Microsystems, ArtRight Software, C.A.R. Inc., Image Club, New Islandview/MGI, Multi-Ad Ser-

vision Technologies, and Studio Advertising Art also offer custom collections.

A more ambitious approach to selective shopping is *Clip-Art Window Shopper* from Adonis Corp. (800-234-9497). This on-line service lets you peruse a database of bitmapped thumbnails from

15 different clip-art vendors—including ArtRight, Dream Maker, Micrografx, 3G Graphics, and T/Maker—and then select the ones you want to download. Adonis doesn't charge for the connect time, but the cost of the communication software and a one-year subscription is \$49.95 (renewals are \$35). The real money changes hands when you find the image you want. You can order an entire clip-art library, which is shipped out (and billed) to you immediately. Alternatively, if the clip-art manufacturer permits it, you can purchase a single image and download it on the spot.

Clip-Art Window Shopper is unique in that it lets you sample images from a number of different clip-art vendors, but it isn't perfect. You need Windows 3.0 to run it, and you must pay for the long-distance telephone calls to Washington state. Little quirks with the program, like its insistence on downloading any thumbnails that you view to your hard disk, can be annoying. And most important, the convenience of purchasing only one image at a time is offset by the price. Individual images can cost from \$1 to \$18 each—and that can get expensive.

IMAGES BY SUBSCRIPTION

A twist on an older type of distribution scheme is the subscription services offered by some clip-art vendors. Dynamic Graphics, for instance, is promoting what is basically a record-of-the-month club for clip art, called The Designer's Club (800-255-8800). For a monthly subscription price of \$49.50, you receive 12 shipments, each containing over 50 EPS and TIFF images. ArtRight, Islandview/MGI, Multi-Ad Services, Studio Advertising Art, and Totem Graphics offer similar subscription plans. Of course, there's a potential drawback in that you have to take what they give you. Since you don't have any control over the categories of images they send, clip-art subscriptions will ultimately be more appealing to professional designers in need of constant variety than to business users.

Finally, if you need one particular image and can't find it anywhere, you can commission it from a service. Applied Microsystems, ArtRight Software, ArtWare Systems, C.A.R. Inc., Computer Support Corp., Hired Hand Design, Micrografx, Studio Advertising Art, and Totem Graphics will all produce custom clip art. Most will give you estimates on time and cost.

a company
INSTANT ACCESS
The second is PicturePak
logo comes with an
(from the library to think of con-
librarians that concept. In
core stopwatch and the
time and geography
evoking the name of this
company: Instant Access.

The globe a second time also
the same basic image can
with radically different designs. If
you compare the two different draw-
ings, you discover that the globe seems
stronger and more graphically defined
here. The different look is achieved by
using flat, bright colors instead of subtle
gradient fills and by changing the line
width of the objects.

Line widths may seem like a small detail, but they can change the entire feeling of a drawing. Thin lines are sophisticated; thick lines are forthright. Thin lines are often used in realistic renderings, while thick lines stress design elements. Clip-art images from different sources used together often look wrong precisely because they use inconsistent line weights. When you combine such images into one drawing, work with the quality of the lines to make sure that the newly combined image looks like it all flowed from the same pen.

The thickness of the line is carried through the type and rule treatment. The wide blue rule literally ties the text to the image. And the sans serif type has a good clean line. It was originally set in italic type, but that seemed too static, so the type was skewed within CorelDRAW to increase the sense of movement.

It's futile to create a subtly shaded logo if its destiny is to be imported into a presentation program with a limited 16-color indexed palette. If this is the case, plan ahead. Jot down the RGB values of the colors used by your presentation program (the manual may list this information in the appendix, or you can get it from the vendor), and create a matching palette in your drawing program. The Instant Access logo proves that even the simplest, brightest, colors can be used effectively.

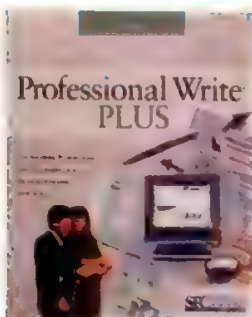
Instant Access might seem like the simpler of the two images, but it actually required more work. For example, I edited the nodes of the globe to fit exactly into the interior of the stopwatch. And because the stopwatch is composed of an open curve that shares line segments with the drawing of the hand, I couldn't just add a yellow fill. Instead, I had to add a separate yellow object that matches the outline of the stopwatch to the backplane of this image.

BE CREATIVE

There are hordes of other modification techniques besides the ones illustrated in this sidebar. Don't be afraid to experiment. Visual feedback is really the best way to learn about good design, and if you work on a copy, you won't do any damage to the original image.

Duplicate a piece of clip art to create background patterns. Layer images over one another to create a pseudo three-dimensional effect. Or wrap text around the curved or irregular outlines of clip art to integrate the words and pictures. In a very short time you'll develop the confidence and the design sense necessary to turn stock illustrations into customized art. ■

MicroWAREHOUSE 1-



★ Professional Write Plus
(Software Publishing) Professional Write PLUS is a Windows word processor designed to improve the productivity of business professionals and the power of their documents. Its unique icon commands cut through complicated menus. Takes full advantage of Windows with WYSIWYG graphics and hot-links and includes a built-in grammar checker and MHS e-mail front end. **WP1523/5 \$169.**

NEW!

★ The DeskTop Set

(Okua Corporation) The tools that work! Listen to what people are saying about The DeskTop Set: "...the most complete Rolodex dialer combo ever," PC World. "...dialer offers an amazing array of fancy features," PC Magazine. "The easy-to-use DeskTop Set comes with an elaborate calendar," PC Week. "...the on-screen calculator tape may be worth the price tag," PC World. **BS3124 \$85.**



★ TypeAlign

(Adobe) TypeAlign, new from Adobe, provides text manipulation capabilities and compatibility with graphics and drawing applications. With TypeAlign you can freely mix typefaces, styles and sizes, perform text edits, deletions, or insertions even after applying special effects. Features text zooms and rotations, application of color or grayscale, rulers and grids, multiple cut and paste and much more. **GR2094 \$59.**

NEW!

★ CorelDRAW! 2.0

(Corel Systems) CorelDRAW! is the award winning PC graphics software that gives you incredible type control and superb drawing power in a value-packed program. Now, CorelDRAW! 2.0 comes with more drawing power and over 150 fonts; over 3500 clipart images and symbols; 31 import/export filters; an autotrace utility, a font conversion program and Mosaic, a visual file manager. **GR0543/5 \$369.**



★ Presentation Task Force

(New Vision Technologies) Clip art for those who mean business. Presentation Task Force contains 1,100 vector graphics in the popular CGM format, making it compatible with most PC charting, drawing and word processing programs. The collection has been designed for business, health care and military professionals, and is suitable for all types of color and black and white printers. **GR0823/5 \$105.**

NEW!



★ WinConnect

(Traveling Software) WinConnect is the file sharing, file transfer and file management utility that you can use within any Windows program. Allows you to access your laptop from your desktop as if it were an extra drive. Includes File enhancer by hDC Computer Corporation. Both use MicroApp technology so you can pop them up over the program you're using. **UT2014 \$65.**



★ QEMM 386 5.1

(Quarterdeck Office Systems) Say goodbye to memory expansion problems when you install Quarterdeck Expanded Memory Manager 386 (QEMM 386). This award winning utility cleverly manages both extended and expanded memory in 80386, 80386SX and 486 computers, freeing up to an additional 226K for your programs to run in. QEMM 5.1 now supports Microsoft Windows 3.0! **EX1103/5 \$61.**

MicroWarehouse
YOUR
WINDOWS
SOURCE!

Item numbers ending in 3 and 5 denote products available in 3 1/2" and 5 1/4" formats, respectively. Item numbers ending in 4 denote that both formats are included. Please refer to item numbers when ordering.

★ Windows-compatible products

COMPUTERS

ALR			
CP0013	ALR PowerFlex 286/40	1199	
CP0020	ALR 386SX 16 MHZ PowerFlex	345	
Sharp			
CP0080	Wizard 8200	399	

MEMORY

Sieman/Samsung		
MY0009/2	DRAM 1Mb 80ns/100ns	8/7
MY0005	SIMM 1Mb 70ns	62
MY0013	SIMM 1Mb 100ns	68
MY0010	SIMM 256K 100ns	25

EXPANSION & UPGRADES

All Computer	
EX0870	All Charge Card with Adaptors 299
ATI	
EX0795	VGA Wonder w/512K 239
CH Products	
EX1340	Game Card III Automatic 29
Comuter Elektronik Infosys	
EX1390	PS/1 2MB Memory 249
Creative Labs, Inc.	
EN0910	Sound Blaster 159
Digital Vision	
EX1195	Computer Eyes Prof. Series 359
InfoChip Systems	
EX1330	Expanz 135
Intel	
EX1110	Co-Processor 80387SX 305
EX0180	Co-Processor 80387-20 439
EX0260	Inboard 386/PC - 1MB 505

MEDIA & ACCESSORIES

BASF Disks (box of 10)			
ME0155	5 1/4" DS/HD (1.2Mb)		10
Compuable			
AC0360	Switch Box 2-Position		19
Curtis			
AC2920	Command Center		89
AC2330	Computer Tool Kit (52 pc)		45

-7080

aton	Masterpiece Plus	109
ME0033	Powerbacker 360	219
ME0043	Maxell Disks (box of 10)	12
Microref	3 1/2" DS/OD (720k)	21
	3 1/2" DS/HD (1.44Mb)	Call
Perma Power	Keyboard Templates (various)	545
AC3340	SPS 500L	19
Power Backups	Getting To Know Windows	10
Sony (box of 10)	3 1/2" DS/OD (720K)	19
ME0053	3 1/2" DS/HD (1.44Mb)	10
ME0063	3 1/2" DS/HD (1.44Mb)	189
	Premier Leather Case	147
	Other Laptop Case	54
	Laptop Case	59
	Other Laptop Case	59
longa	CA 400	95
DR0610	20M ROM	55

ORDER
24 HOURS
A DAY, 7 DAYS
A WEEK!

DR1030	Bernoulli Box II Dual 44Mb Ext.	1965.
DR1180	Bernoulli Transportable	990.
MicroSolutions		
DR1790	backpack 2.8Mb	279.
NEC		
CD0060	CD-ROM Portable CDR-35	439.
CD0100	Interface Kit (XT/AT)	144.
Plus Development		
DR1000	Hardcard II 80 (19ms)	589.
DR1250	105Mb Hardcard 2XL	699.
Solutions for Your PC/XT		
DR0960/70	3 1/2" 1.44Mb Flopp & Ctr.	127.

PRINTERS & CARTRIDGES

Adobe			
PR1600	Adobe PostScript Cartridge	305.	
PR1580/70	PostScript Cartridge 1&2	ea.140.	
PR1314	★ Adobe Plus Pack for PC	119.	
AEG Olympia			
PR1750	NP80-24E Printer	329.	
Canon			
PR1710	Auto Sheet Feeder for BJ-10e	72.	
PR1510	BJ-10e Bubble Jet	369.	
PRO460	Laser LBP8 Mark III	1579.	
PRO640	LBP4 Laser	999.	
Citizen			
PRO680	GSX-140 Color Printer	329.	
Elite Business Apps			
PR1270	Charisma 25/Plus	299.	
Insight Development			
UT1714	PrintTools	89.	
Metro Software			
PR1304	PC Artifax	69.	
Pacific Data Products			
PRO410	25 Cartridges in One!	269	
PRO910	Pacific 4 Memory w/ 2Mb	159.	
PR1280/90	Pacific Outlines I or II	205.	
PRO920	Pacific Page Personal Edition 4.0	365.	
Panasonic			
PRO390	KX-P1124 Dot Matrix	289.	
QMS			
PR1720	PS410	2199.	
Seiko Instruments			
PRO690	Smart Label Printer	175.	

MODEMS & FAX BOARDS

Best Data		
MM0550	SmartOne 24/12 Modem	95.
MM0530	Smart One Fax9624 Int.	189
MM0570	9632XL V.32 Ext.	555.

CIRCLE 225 ON READER SERVICE CARD

CHECK OUT OUR PRICES!

OVERNIGHT DELIVERY

Only \$7.00

Cardinal		
MM0510	★ 4800 SendFax Modem	105
MM0770	9600 SendFax Modem	109
Delrina Technology		
FX0123/5	★ WinFax	45
Freecom		
FX0090	Freecom Fax 96	169
Hayes		
FX0020	JT Fax 9600B	399
MM0250	Personal Modem 2400 Plus Ext.	9
MM0210	SmartModem Ultra 9600 V.32	819
CM0294	Smart Com Executive	75
MM0060	SmartModem 2400 External	359
Intel		
MM0330	2400B External	179
FX0100	Satislaxton Classic PC/XT	399
PowerUser		
MM0630	Sendfax 24/48	75
MM0640	Sendfax 24/96	89
MM0680	Send/Receive fax 24/96	199
MM0650	2400 Mini Ext.	89
MM0670	2400 B Plus Int.	159

Practical Peripherals		
MM0110	2400SA Ext.	185
MM0160	PM2400SA Ext. w/ MNP Lvl.5	225
Prometheus		
MM0700	ProModem 9600 Plus	696

The Complete PC		
FX0060	The Complete Communicator	449
FX0040	The Complete Fax/9600	450

UDS/Motorola		
MM0360	FastTALK 9600 V 32/42b Ext.	489

Zoom Telephonics		
MM0660	MX2400S w/9600 Sendfax	112
MM0600	Modem V.42bis 2400 Ext.	199

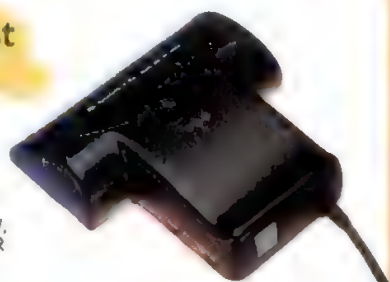
U.S. Robotics		
MM0200	Courier HST 9600	689

INPUT DEVICES

Appoint		
IN0780	Mouse Pen	89
Caere		
IN0984/94	The Typist (AT/PS/2)	419
Calcomp		
IN0640	WIZ	149
CH Products		
IN0910	FlightStick with Falcon	49
FastTrax International		
IN1110	FastTrax	49
Fifth Generation		
IN0900	Logical Connection Plus	589
Kensington		
IN0860/50	Expert Mouse (bus/ser)	124/109
Kraft		
IN1080	Toptrak	72
Logitech		
IN1070	Scanman 256	299
IN0530	Scanman Plus	155
Marstek		
IN1040	Mars 800 Scanner w/OCR	219
IN1020	Mars 105 Plus Scanner w/OCR	149
IN2000	★ M-800W Hand Scan	
	w/ Image-in	199
IN2070	M-6000CG ColorArtist w/ OCR	499

M-6000CG ColorArtist Scanner w/OCR

(Marstek) Marstek has combined color and true gray scale scanning technology together. Scan at 200 DPI and capture up to 262,144 colors in super color mode. In the mono mode, you can capture images at 400 dpi with 64 gray scales. Now bundled with ScanKit Color Utility S/W, Rainbow Paint S/W and Perceive OCR IN2070 \$499.



Total Word

(Volkswriter) Finally, a professional word processing program that's logical and easy to use so you can concentrate on your writing instead of your word processor. If you need to write memos, proposals, reports, scientific papers or the great American novel, Total Word delivers with the ease and flexibility you demand. Pull-down menus, context sensitive help; FREE SOFT FONTS, Spelling Corrector and Thesaurus integrated. **WP0133/5 \$209.**



Shipping - Your choice:
Fast, dependable, overnight service - \$7 up to 7 lbs. Orders for in-stock items placed by 7:00pm ship same day. Ground service available - \$3 (same day shipping).

Microsoft		
IN0890/80	Mouse (bus/ser)	85
IN0275/84	★ Mouse w/Windows (bus/ser)	145
MicroSpeed		
IN0460/50	Trackball PC-Trac (bus/ser)	89/69
MicroTouch Systems		
IN0810	The UnMouse	189
Migraph		
IN1060	★ Color Scanner CS 4096	695
Nisca		
IN1010	★ Niscan/GS for Windows	249
Selko		
IN1000	Seiko Digitizing Tab 3613	309
Z-NIX		
IN1013/15	★ SuperMouse II (bus) w/Win 3.0	95
IN1003/5	★ SuperMouse II (ser) w/Win 3.0	91

MONITORS

Goldstar		
MT0140	14" Analog/VGA	349
NEC		
MT0020	Multisync 2A	545
MT0070	Multisync 3D	669

ENTERTAINMENT & EDUCATION

Artworx		
EN2113/5	Bridge 6.0	27
Banner Blue Software		
ED0444	Family Tree Maker 1.0	45
Broderbund		
EN0734	Simcity	29
EN0864	The Playroom	27
ED0784	Where is Carmen S.D. Deluxe Ed.	49
	Where is Carmen S.D. (various)	ea 35
Centron		
EN1073/5	Casino Master	41
Electronic Arts		
EN1354	Life and Death	34
Entertainment On Line		
EN2013/5	Lottery Tracker & Wheeler	25
HyperGlot		
ED0913/5	Pronunciation Tutor (French)	59
ED0903/5	Pronunciation Tutor (Spanish)	59
ED0933/5	Word Torture (French)	25
ED0923/5	Word Torture (Spanish)	25
MECC		
ED0514/04	Word/Number Munchers	ea 29
ED0484	Oregon Trail	29
MicroAce		
EN1384	Blackjack	39
Microsoft		
EN1473/5	★ Entertainment Pack	29
EN0043/5	★ Flight Simulator 4.0	45

when you order from
MicroWarehouse

14 Great
Programs!

The POWER USER'S TOOL KIT 1.0

The MicroWAREHOUSE technical staff and the publishers of the popular POWER USER'S MANUAL have compiled a great new disk of utilities and applications... **THE POWER USER'S TOOL KIT.**

Fourteen great programs on one handy 5 1/4 inch disk*, including Active Life - a powerful time planner and scheduler for business or personal use, and IconDraw - a hot, new, Win3 utility for designing your own icons.

The POWER USER'S TOOL KIT is FREE from MicroWAREHOUSE when you order from us. If you want the disk, you pay only \$1.50 for shipping and handling. The programs are shareware, so you can try them free of charge. If you wish to continue using them, some authors ask that you pay a fee (\$10-\$150). Many are absolutely free. All of the details are explained on the disk, which is yours to keep. *Requires 1.2 MB High Density Drive.

FREE CATALOG!

We carry more than 1200 PC solutions including all the latest releases and updated versions. Just fill in the information requested below and we'll start your free, one-year subscription to the MicroWAREHOUSE catalog.

I'm Kerry, call me at:

MicroWAREHOUSE®
1-800-367-7080
(1-800-DOS-7080)

Inquiries: 908-370-0518 Fax#: 908-905-5245
Order Toll-Free 24 Hours a Day, 7 Days a Week

Free Micro Warehouse Catalog Subscription
1690 Oak Street, P.O. Box 1590, Lakewood, N.J. 08701

Fill out and mail this coupon to receive a free, one-year subscription to the MicroWarehouse catalog.

Name _____
Address _____ Apt. _____
City _____ State _____ Zip _____
(Expect to receive your next issue within 4-6 weeks)

CIRCLE 225 ON READER SERVICE CARD

1PM051

MicroWAREHOUSE CHECK OUT OUR PRICES!

Ko-Pilot for Lotus 1-2-3 and WordPerfect

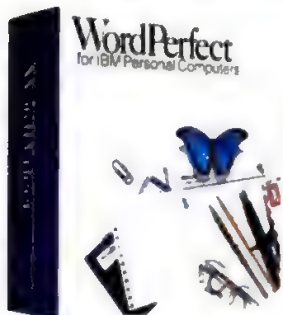
(Insight Resource) Use any WordPerfect or Lotus 1-2-3 feature like a pro without ever reading the manual. Ko-Pilot provides on-line, step-by-step guidance through every task as you work. No other add-in gives you this power-packed combination of instant productivity and great training. Ko-Pilot makes 1-2-3 and WordPerfect a snap!

Ko-Pilot for Lotus 1-2-3 BS3423/5 \$79. Ko-Pilot for WordPerfect 5.1 BS3413/5 \$79. Ko-Pilot for WordPerfect 5.0 BS3433/5 \$79.



WordPerfect 5.1

(WordPerfect Corp.) WordPerfect version 5.1 comes complete with new, innovative features to provide you with even greater flexibility. Bold new features include pull-down menus, mouse support, tables, an equation editor and extensive graphics printing support. Includes some elements of page layout software with its ability to print multiple columns, and to import and size graphics. **WP0363/5 \$249.**



Hijaak

(Inset Systems) Hijaak converts graphic files from one format to another. Features viewable EPS file, typeset quality text screen; converts CAD images to faxable format and captures LaserJet and GPGI plotter output at full resolution directly from the application. Also converts scanner files in TIFF format to a more usable type and much more. **UT1614 \$99.**



Timeslips III 4.0

(Timeslips Corp.) Simplify the tedious task of billing for busy professional firms. A timer module operates in pop-up window, accessible within any application. Accommodates up to 3400 clients, with as many as 250 professionals. Features time and expense tracking, a choice of customizable bill formats, customer management reports and complete account receivable tracking. **BS0133/5 \$189.**



DesignCAD 3-D 3.1

(American Small Business Co.) DesignCAD 3-D will give your PC the power of a mainframe CAD system at a fraction of the price. Determine the volume, surface area, center of gravity and interference between objects. DesignCAD supports more than 400 peripheral devices and is compatible with an extensive array of graphics software and CAD systems, including AutoCAD. **CA0023/5 \$206.**



Masterpiece Plus

(Kensington Microware) Combine power line and phone line protection in an attractive control center that fits right under your monitor on a detachable swivel base. Offers five protected three-prong outlets with individual switches, a phone/modem line, surge suppression and a master switch. Awarded PC Magazine's "Editor's Choice" **AC0140 \$109.**



JT Fax™ 9600B

(Hayes) Send your faxes to and from any Group 3 facsimile machine or PC-based fax. Convert and send files in one step, store fax numbers, schedule transmissions for unattended use; has high and low resolution, background capabilities and more. Included is Smartmodem 2400 module and Smartcom EZ software, providing you with a complete fax/data communications system for PCs. **FX0020 \$399.**

PC Globe Inc.

BS1833/5 PC Globe 4.0 39
BS1843/5 PC USA 2.0 39
Software Toolworks
ED0594 US Atlas 45
Sphere Inc.
EN0194 Tetris 23
Toyogo
EN1464 Nemesis Go Master Deluxe 95
Visionary Software
EN1413/5 Synchronicity 2.0 36

DESKTOP PUBLISHING & GRAPHICS

Adobe

PR1594 Adobe Fonts (various) Call
GR2094 Adobe Type Manager 55
★ TypeAlign 59

Aldus

GR2053/5/4 PageMaker 4.0 489/535
ArtRight
GR0613/5 Image Portfolio Vol. 1 110
GR0623/5 Image Portfolio Vol. 2 110
★ Image Portfolio (various) 85

Atech

BN0014 Pub Powerpak w/free Bundle 55

AutoDesk

GR0904 AutoDesk Animator 263

Berkeley Systems

GR1994 After Dark 29

Bitstream

GR1494 FaceLift for Windows 55
GR1844 FaceLift for WordPerfect 59

Broderbund

GR1564 New Printshop 35
GR0064 New Printshop Companion 29

Caere Corporation

GR1984 Omnipage 386 3.0 479

Computer Associates Int'l

GR1823/5 CA Cricket Graph 1.2 139
GR1833/5 CA-Cricket Presents 1.2 319

Corel Systems

GR0543/5 CorelDRAW! 2.0 369

Custom Applications

GR1945 Freedom of Press Light 2.5 55

hDC Computer Corp.

BS3114 Icon Designer 35

Icom Simulations

GR1854 Intermission 35

Micrografix

GR1293/5 Designer 3.02 469
GR1773/5 Charisma 344

Microsoft

BS2304 Powerpoint for Windows 319

New Visions Technology

GR0823/5 Presentation Task Force 105

Power Up Software

GR0884 Express Publisher 2.0 89

Software Publishing

GR0083/5 Harvard Graphics 2.3 319

Timeworks

GR0554 Publish-It! 1.2 135

WordPerfect

GR1194 DrawPerfect 269

Xerox

GR1574 Ventura Pub. Gold 3.0 (Win.) 549

Z-Soft

GR0634 PC Paintbrush IV Plus 115

CAD PRODUCTS

American Small Business Co.

CA0023/5 DesignCAD 3D 3.1 206

CA0013/5	Design CAD 4.2	156.
AutoDesk		
CA0173/5	Autosketch 3.0	146.
Computer Easy		
CA0153/5	Dream House Professional	47.
Foresight Resources		
CA0124	★ Draft Windows CAD 3.0	439.
Generic Software		
CA0074	Generic CADD 5.0	235.
MathSoft		
CA0114	MathCAD 2.5	309.

BUSINESS

Abacus		
UT1684	★ Becker Tools	48.
Absolute Solutions		
FN0284	★ Computerized Classic Acct.	259.
Application Techniques		
BS0204	Pizzazz Plus	65.
and Software, Inc.		
BS2754	★ Planisoft 2.5	139.
Ashton Tate		
BS0773/5	DBASE IV 1.1	489.
Avery		
GR0804	Label Pro	49.
Bell Atlantic Corp.		
UT0914	★ Think	323.
Bloc Publishing		
BS0044	Form Tool Gold 3.0	58.
Borland International		
BS0214	Paradox 3.5	519.
BS3044	Quattro Pro 2.0	329.
Buttware		
BS2094	PC File 5.0	99.
Central Point Software		
UT1794	Central Point Backup	59.
UT0854	PC Tools Deluxe 6.0	89.
CheckFree Technologies		
FN0134	CheckFree Express 2.0	19.
Chronologic Corp.		
UT0584	Instant Recall	62.
Chronos		
BS2184	Who What When 2.0	169.
Compuserve		
CM0074	Compuserve Membership Kit	21.
Contact Software Int'l		
BS1064	ACTI 2.0	225.
Crosstalk Communications		
CM0284	Crosstalk Communicator	65.
CM0193/5	★ Crosstalk for Windows 1.1	129.
CM0033/5	Crosstalk MK IV 2.0	150.
CM0043/5	Crosstalk XVI 3.71	130.
DacEasy Inc.		
FN0014	Dac Easy Accounting 4.1	85.
FN0024	Dac Easy Bonus Pak 4.1	129.
Darlana Technology		
UT1894	System Sleuth Analyzer	45.
UT1904	System Sleuth Pro	85.
UT1704	★ Win Sleuth	85.
DataEase International		
BS1904	DataEase 4.2	476.
Datastorm Tech.		
CM0424	Procomm Plus 2.0	65.
Delrina Technology		
BS0853/5	PerFORM Designer & Filler 2.1	99.
BS2604	★ PerFORM PRO	269.
Delta Technology		
UT0724	Direct Access 5.0	65.
Dynamic Microprocessor Assoc.		
CM0173/5	pcAnywhere IV	99.
Easy Automation		
BS3033/5	Form Type	159.
ElaShim Microcomputers, Inc.		
BS3243/5	VirusSafe	55.

MICRO WAREHOUSE *

1690 Oak Street P.O. Box 1590 Lakewood N.J. 08701
©1991 Micro Warehouse Inc.

- Visa and Mastercard accepted
- Your credit card will not be charged until your order is shipped
- Purchase orders subject to credit approval
- All products covered by 120 day "no warranty"
- *Defective software replaced immediately
- Hardware replaced or repaired at our discretion
- CT residents add 8% sales tax N.J. and Ohio residents add appropriate sales tax
- Orders for in-stock items placed by 7:00 p.m. (E) weekdays (barring system failure, etc.) ship overnight by Airborne Express (Some areas require an extra day)
- Shipping charge \$7 per order up to 7 lbs. \$1 per lb. above 7 lbs.
- UPS ground service also available upon request - \$3 per order
- UPS orders placed by 3:00 p.m. (E) weekdays ship same day
- Actual freight charges apply for computers, hard disks
- Bernoulli's tape back-ups, monitors and UPS or printers
- Alaska, Hawaii, outside continental U.S.
- APO/FPO call for information
- Item availability and price subject to change without notice
- Software is not copy protected, except where marked by asterisk
- We reserve the right to limit quantities
- Please indicate disk size



★ PageMaker 4.0

(Aldus) Integrate text and graphics to produce professional-quality printed communications. File compatibility with Windows, OS/2 and Macintosh. Features new support for long documents and advanced text handling capabilities. **GR2053/5/4 \$489/535.**



Casino Master

(Centra) Learn and practice casino gambling at your own pace, risk-free. Casino Master combines five casino games into one package: Blackjack Ace, CrapsMaster, RouletteMaster, PokerMaster and BacaratMaster. **EN1073/5 \$41.**



Peachtree Complete III 5.0 (Peachtree Software)

Let Peachtree Complete handle your business accounting needs. This full featured software includes a General Ledger, Accounts Payable, Accounts Receivable, Purchase Orders, Payroll, Inventory and more. **FN0233/5 \$145.**



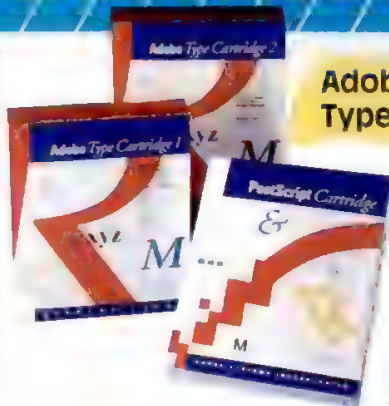
The Norton AntiVirus

(Symantec) The Norton AntiVirus is always on guard to protect against viruses before they enter your system. If your computer is already infected, The Norton AntiVirus can easily detect the viruses and remove them from your system. **UT1694 \$84**



Bridge 6.0

(Artworx) Play contract or duplicate Bridge on your PC. Bidding is Standard American, Five Card Major with Blackwood and Stayman Conventions. Keeps score, has auto and suggest modes and more. **EN2113/5 \$27.**



Adobe PostScript Type Cartridges 1&2

(Adobe) Expand your type library with PostScript Type Cartridges from Adobe. Each cartridge works in the HP LaserJet Series II in conjunction with Adobe PostScript Cartridge, which allows you to rotate, skew and shade any text or PostScript graphics in the document. All type faces are scalable to any size and prints at the highest resolution of the printer.

PostScript Type Cartridge 1 PR1580 \$140. PostScript Type Cartridge 2 PR1570 \$140. PostScript Cartridge PR1600 \$305.

Enable Software

BS0893/5 Enable O/A 3.0 429
BS1803/5 Enable BP 119/129

Fifth Generation

UT0124 Fastback Plus 2.10 115

Formworx Corp.

BS2524 ★ Form Publisher for Windows ... 149

Fox Software

BS0705 Foxbase + Dev. System 2.10 189
BS1795 FoxPro 455.
BS2024 FoxPro LAN 649

Funk Software

BS0624 Sideways 3.3 59

GeoWorks

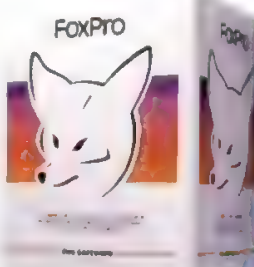
OP0064 GeoWorks Ensemble 125

Gibson Research

UT0874 Spinnle II 1.1 65.

FoxPro 1.02

(Fox Software) Combine astonishing performance with amazing power and elegance, using FoxPro from Fox Software. Become productive immediately while utilizing enough power and sophistication to satisfy the most demanding developers and power users. Take full advantage of speed, expanded memory and extended video modes comparable to the most advanced machines available today. **BS1795 \$455.**



Great American Software

FN0264 Money Matters 51.
FN0215 One-Write Plus Acct. System 170

nDC Computer Corp.

UT1944 ★ FileApps 69.
UT1634 ★ FirstApps 49.
UT0644 ★ Windows Express 3.0 49.

Helix

BS3154 ★ NetRoom Single User 49.
BS3134 ★ NetRoom 4 User 91.

Hewlett Packard

BS2783/5 ★ New Wave 3.0 125.

Hilgraeve

CM0064 Hyper Access/5 1.1 125

Informix

BS2283/5 ★ Wingz for Windows and OS/2 329

Insight Resource

BS3423/5 Ko-Pilot for Lotus 1-2-3 79.
BS3413/5 Ko-Pilot for WordPerfect 5.1 79
BS3433/5 Ko-Pilot for WordPerfect 5.0 79.

Inner Media, Inc.

UT1754 ★ Wide Angle 85

Inet Systems

UT1614 HiJaak 2.0 99

Intuit

FN0164 Quicken 4.0 37

Iris Associates

BS0914 ★ 3 for 3 84

Jacoby & Myers Law Offices

BS2923/5 WillPower 32.

Lifefree

BS3104 Correct Grammar 3.0 59.

Lotus

BS3174 Agenda 2.0 288
GR0864 Ami Pro 1.2 305
BS1473/5 Lotus 1-2-3 Rel. 2.2 339.
BS2433/5 ★ Lotus 1-2-3 Rel. 3.1 419.
BS2323/5 Symphony 2.2 519

Meca

FN0243/5 Managing Your Money 7.0 129

Merril & Bryan

UT1654 ★ Turbo EMS 6.0 56

Microcom

CM0083/5 Carbon Copy Plus 5 2.2 115

Micro Logic

BS2144 InfoSelect 56.

Microsoft

BS3254 ★ Excel for Windows 3.0 309
BS2723/5 ★ Office for Windows 649
BS2733/5 ★ Productivity Pack 42
BS2704 ★ Project for Windows 1.0 449
BS2253/5 ★ Windows 3.0 90
BS1954 ★ Windows Developer's Tool Kit 319
WP0043/5 Word 5.5 205
WP0374 ★ Word for Windows 1.1 309
BS0173/5 Works 2.0 95

NBI, Inc.

WP0554 ★ Legacy 298.

Nolo Press

BS0124 Willmaker 4.0 36

Norton-Lambert

CM0143/5 Close-Up Customer/Terminal 3.0 129
CM0434 Close-Up LAN 550
CM0153/5 Close-Up Support/ACS 3.0 159

Okna Corporation

BS3124 ★ Desk Top Set 85.

Peachtree Software

FN0233/5 Peachtree Complete III 5.0 145
FN0253/5 Peachtree Cmpl. III Bonus Bdle 219

Polaris

BS2894 ★ PackRat 3.0 259

Precision Software

BS1874 ★ Superbase 4 Windows 419

Prisma Software

UT1044 ★ Your Way 119

Prodigy

CM0264 Prodigy Startup Kit 29

QMS

BS1624 ★ Ultrascript PC Plus 279.

Qualitas

UT0683/5 386Max Professional 5.1 75

PC-Cillin Virus

Immune System

(Tread Micro Devices) PC-Cillin immunizes your computer against over 70 known viruses and protects against newly developed viruses. Deletes infected files before installing, stays in your system to prevent any virus infections and safekeeps the boot sector's data for use in emergencies. Menu driven, built in self checking and more. **UT1964 \$99.**

NEW!

Quarterdeck Office Sys.

BS0163/5 DESQview 2.3 79
BS1043/5 DESQview 386 2.3 135
UT0743 QEMM 50/60 5.1 59
EX1103/5 ★ QEMM 386 5.1 61

Que Software

WP0544 RightWriter 4.0 59

Reality Technologies

FN0124 Wealthbuilder 1.1 139
BS0634 WealthStarter 35

Reference Software

WP0334 Grammatik IV 2.0 57.
WP0514 ★ Grammatik Windows 55.

Softlogic Solutions

UT0073/5 Disk Optimizer 4 05 41.

Software Directions

UT1914 ★ Print Q 5.0 85
UT0884 PrintQ LAN 259.

Software Products International

BS2863/5 ★ Access SQL 949
BS2873/5 Open Access 425.

Software Publishing

WP0463/5 Professional Write 2.2 165
WP1523/5 Professional Write Plus 169.

Spinnaker Software

BS1923/5 BetterWorking Eight-In-One 35
BS1134 The Resume Kit 29

Sybiz

FN0314 Service Industry Accounting 295

Symantec

BS0653 Q&A 3.0 235
UT1694 Norton AntiVirus 84
UT0054 Norton Util. Advanced 5.0 115
UT1604 The Norton Backup 1.2 95
BS2113/5 Timeline 4.0 472

Symantec/Helix

BN0024 Norton Util. w/ Netroom Bundle ... 134

ThreadZ Software Design Group Inc.

UT1804 ★ ThreadZ File F/X 75

Timeslips Corp.

BS0133/5 Timeslips III 4.0 189.

Touchstone

UT0734 Check It! 3.0 85

Traveling Software

UT0394 Laplink III 89
UT2014 WinConnect 65

Trend Micro Devices

UT1964 PC-Cillin Virus Immune System ... 99

TriSoft

UT1733/5 ★ Whereabouts Deluxe 59

Vertisoft

UT0904 Double Disk 65

Volkswriter

WP0133/5 Total Word 209

WestCliff Software

WP1503/5 DosAmigos 99

WordPerfect Corp.

WP0363/5 WordPerfect 5.1 249
WP0504 LetterPerfect 125

WordScience

WP0483/5 Definitions Plus 69

WordStar U.S.A.

WP0634 WordStar Legacy 269

XTree Company

UT1874 XTree Pro Gold 2.0 95

LANGUAGES

Asymetrix

LN1454 ★ Toolbook 299.

Borland International

LN0023/5 Turbo C++ 135
LN0153/5 Turbo C.Prol. ++ 199

Microsoft

LN0074 C Compiler 6.0 319
LN0043/5 QuickC 2.5 69

Nantucket

LN1444 Clipper 5.0 519

Solution Systems

LN0433/5 Brief 3.0 for DOS 179.

Spinnaker Software

LN1464 ★ Spinnaker Plus 279.



DO-IT-YOURSELF

The idea of making your own clip art might appeal to the truly thrifty among you. The process is not that difficult: All you need is a scanner, a source of images, a graphics program with an autotracing feature, and the patience to clean up the resulting file. North Light Books (800-289-0963) has a line of "scannable" clip-art books that sell for \$19.95 each. But be careful what you scan: If you don't know the authorship (the same applies to freely distributed images downloaded from bulletin boards), you could put yourself at risk of copyright violation.

Abusing the copyright that accrues automatically to the creator or vendor of stock images is a serious violation of the

contract you enter into when you purchase a clip-art package. It's easy to get confused about copyright law, and indeed its full implications as they relate to electronic images are still being worked out in the courts. Witness the ongoing dispute between Software Publishing Corp. and Computer Support Corp. over the striking similarities between the clip art that comes with *Harvard Graphics* and images in the *Arts & Letters* library. It may well take a jury to decide whether Computer Support Corp., as it claims, has been robbed of its lawful copyright.

To make things simple, remember this: You do not have any copyrights to the clip

art you are buying, only licensing rights that allow you to use the images in your newsletters, presentations, and other business publications. You can freely distribute documents that include clip art, but you do not have the right to distribute the clip art itself. You can't repack one or more clip-art images for sale, nor can you duplicate the disks for use by a colleague.

FILLING THE GAPS

Electronic clip art has come a long way from its crude beginnings, mainly because both professional art directors and business users are more demanding. Stock electronic illustration is growing up, and more business-oriented images exist today than ever before. There are still some gaps; why, for instance, is it so rare to see people with discernibly black features sitting in an office or participating in a meeting? In the meantime, we'll just have to keep the pressure on the artists out there to produce meaningful, sophisticated, and—most important—editable clip art.

ARTRIGHT SOFTWARE ArtRight Image Portfolios

by Gary Kaplow

For a good selection of color clip-art images, nothing beats *ArtRight Image Portfolios*. The library consists of eight very stylized and often realistic libraries of color clip art, priced at \$149 per volume or \$899 for the complete set. All images in the eight-volume library were created in *CorelDRAW*. Although editing the images is easiest in *CorelDRAW*, the images are available in CGM, EPS, Micrografx .DRW and GEM formats to suit most any need. Later this year ArtRight will release a single CD-ROM disk with the entire library on it.

If you use clip art only once in a while but like to have a complete variety of images ranging from cars to people, from symbols to musical instruments, you'll be interested in ArtRight's first two volumes of clip art. Both volumes consist of a good sampling of vehicles, international signs and symbols, business supplies, and people, places, and things. But if your needs are more specific, one or all of the other six volumes might be for you. Each volume is devoted to a specific theme, and



EDITORS' CHOICE

- ArtRight Image Portfolios
- Arts & Letters
- Images With Impact!

Any library may have just the right image. But if you're thinking of investing in a whole library, three of the ones we reviewed stand out for selection, quality, and editability.

Arts & Letters stands out for sheer comprehensiveness. You'll find just about every kind of image you can imagine in this 5,000-image collection, and they're of high quality, well colored, and easily edited. Its only drawback is its proprietary image format. *Arts & Letters Graphics Editor* (\$695), which includes a full-fledged illustration package, and *Arts & Letters Graphics Composer* (\$395), give you all the tools you need to get the images into your own application, either by exporting them or by pasting them through the *Windows* clipboard.

ArtRight Image Portfolios (\$149 per volume) and *Images With Impact!* (with volumes ranging from \$99.95 to \$189.95) are more-conventional EPS-format clip-art libraries, but they stand out from the others in the organization of their objects, which makes them the most suitable for editing and recoloring. Both libraries are imaginative in artistic quality, and both provide a good selection of useful business images. Many of the drawings in *Images With Impact!*

even do double duty: Component parts—for example, wrenches within a toolbox—are fully formed and can be ungrouped and used individually.

While it's not the right choice for most clip-art uses, *Totem Color Clip Art* (\$125 per volume) deserves an honorable mention for sheer, breathtaking artistry. Its meticulously rendered color EPS images of fish, birds, women, and other subjects are by far the nicest of this group. But this level of detail comes at the price of usability: Each image has so many objects that it's almost impossible to work with them or modify them to suit your intent. They're best used as accents in color publications, where their fine details can really shine.

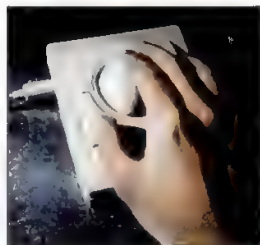
To judge by our experience in this review, EPS is a far more stable and useful format for clip art than CGM. If you're planning to do more than the simplest modifications, it's worthwhile investing in a drawing package that can handle EPS and other complex formats. Still, if you just want a selection of CGM images that you can place in your *Harvard Graphics* or other business presentations, *Presentation Task Force* is a good bet. It's the best of the CGM packages for overall quality and usability, and at \$199 for 1,100 images, it comes at a good price.



WHY THE BEST MOUSE FOR THE MAC IS YOUR BEST CHOICE FOR WINDOWS:

In the graphical environment of the Macintosh® our Turbo Mouse® is number 1 in both sales and awards. That's why your choice for the graphical environment of Windows should be our PC version: Expert Mouse™.

What makes Expert Mouse outshine the rest? Superior optical hardware and unique software are the difference.



One button lets you pull down a menu or open a window. The other button can be set to "click-lock" for extended selections like automatic scrolling.

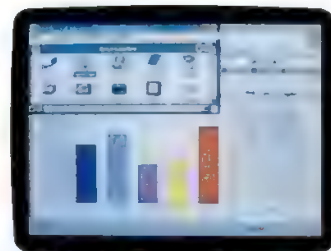
Press both buttons together and you activate our special "chording" feature. Chording gives you advanced features, like three-button emulation, without the inconvenience of lifting your hand off the ball.

What's more, our Custom Control Panel lets you adjust both acceleration and double-click speed to match the way you work. It even lets you decide which button performs what function.

Best of all is the way Expert Mouse feels — solid and comfortable, with an easy ball movement that means no jumping or sticking.

And Expert Mouse is 100% Microsoft compatible. So you will be able to run all your favorite Windows applications.

Windows can make your computer a lot easier to use. Now, the Kensington Expert Mouse will make it even easier.



For a free brochure and the dealer nearest you, call 800-535-4242. Outside the U.S. 415-572-2700.

KENSINGTON.

CIRCLE 220 ON READER SERVICE CARD

Expert Mouse is a trademark and Kensington and Turbo Mouse are registered trademarks of Kensington Microware Limited. Microsoft and Windows are registered trademarks of Microsoft Corporation. Macintosh is a registered trademark of Apple Computer Inc. © 1990 Kensington Microware Limited.

GRAPHICS VECTOR CLIP ART

it's easy to find the image you're looking for. Unfortunately, the black-and-white catalog doesn't do justice to these color images.

Two of the strongest volumes in the library are the transportation and technology collections. Both are rich in illustration and content. However, though the transportation volume has everything from a Honda CRX to the weapons of war, the cars in the volume are no newer than 1989. The technology volume is equally well stocked: PCs, PC clones, portables, and small-footprint computers are all represented, and there's even a good illustration of the back of a computer. The volume also includes add-on peripherals, input and output devices, and connectivity-related symbols. Though most of the images are computers, there is also a selection of electrical symbols, flowchart elements, and electrical home appliances. Many items are illustrated with a sense of perspective that pulls you right into the drawing.

ILLUSTRIOUS ILLUSTRATIONS

Other volumes, such as World Flags, Borders, and Signs and Symbols have just about any background or symbol you're likely to need, and these are of high artistic quality. The last two volumes, People and Animals, are just as complete in content, but though there are a few exceptional illustrations in these volumes (which are the newer additions to the library), on the whole ArtRight needs to look into an upgrade of these libraries. Editing and recoloring any of these images is easy: They have a fairly high number of nodes, but they tend to be efficiently used. Color images print very well in gray scales.

ArtRight Image Portfolios' libraries are both complete and well executed. The illustration style is sharp, and the colors realistic. With the exception of the People and Animals volumes, *ArtRight* is one of the better clip-art packages on the market.



ArtRight Image Portfolios are particularly well-stocked with high-tech images, including cars and military equipment. But its images of people are not quite as thoughtfully rendered.

FACT FILE EDITORS' CHOICE

ArtRight Image Portfolios

ArtRight Software,
1130 Morrison Dr.,
Ottawa, Ontario
K2H 9N6 Canada;
613-820-1000.

Formats: CGM, EPS, GEM, Micrografx (.DRW), CorelDRAW (.CDR)

List Price: \$149 per volume; \$899 for first eight volumes. Volume 1 (252 images); Volume 2 (192 images); People (240 images); Transport (192 images); Technology (230 images); Borders (300 images); Animals (204 images); World Flags (300 images); Symbols and Signs (994 images).

In Short: With a broad selection of high-quality color EPS images that are well-grouped and easy to edit, *ArtRight Image Portfolios* is one of the better collections in this group.

CIRCLE 842 ON READER SERVICE CARD

COMPUTER SUPPORT CORP. Arts & Letters

by Paul Murphy

While it may seem unreasonable to expect anyone to spend \$695 for a clip-art collection, in the case of *Arts & Letters*, it's money well spent: This is one of the finest, most comprehensive collections available. And while its price may seem steep, the *Arts & Letters Graphics Editor*, which houses the 5,000-image collection, is a full-featured Windows 3.0 illustration package in a league with *CorelDRAW* and *Micrografx Designer*. For those with economy in mind, the \$395 *Arts & Letters Graphics Composer* features the same 5,000-image, 50-font library as its sibling but without the editor.

A&L's vector clip art is stored in proprietary archives that can be accessed only by the Editor or Composer. One advantage is that the entire library consumes a moderate 6.4MB of disk space, or about 1.3K per image—much less than a comparable CGM or EPS library. Each image, along with its symbol number, is displayed by category as an exact gray-scale rendering in an attractive and logically arranged handbook. Although there are no facilities for a software-based text search for symbols, a comprehensive index in the handbook lists symbol numbers by alphabetic symbol descriptions.

Images range from accents, geometric symbols, and hundreds of arrows, borders, and agricultural symbols to aircraft,

If you think the LaserPrinter E looks good in person,



wait till you see how it looks on paper.

	The New IBM LaserPrinter E	HP LaserJet IIP
Speed	✓ up to 5 ppm	up to 4 ppm
Speed upgrade option	✓ up to 10 ppm	No
Adobe PostScript option	Yes	Yes
Printer emulation	✓ IBM, HP PCL	HP PCL
Std. plotter emulation	✓ Yes	No
Font card slots	✓ 2	1
Std. input paper tray capacity	✓ 200	50
Std. output paper tray capacity	✓ 100	50
Opt. sec. input paper tray capacity	✓ 500	250
Opt. envelope tray capacity	✓ 75	20

Any way you look at it, the IBM LaserPrinter E gives you a lot of appealing features at a very appealing price.

The affordable IBM LaserPrinter E gives you all the advantages of laser quality output 25% faster than the major competitor, the HP LaserJet IIP. The IBM LaserPrinter E also comes standard with four times the paper capacity and twice the number of font slots.

Plus, the IBM LaserPrinter E is unique in its price range because it lets you customize your printer's speed and features to meet your exact needs at any given moment. All of which makes the IBM Laser Printer E the only affordable

laser printer that lets you buy now and grow later.

For example, if you decide you want faster printing, only the LaserPrinter E lets you double its speed.

Or if your software requires the Adobe PostScript® language, the LaserPrinter E can also give you that creative flexibility at a reasonable price.

Or if you decide you could use automatic collating of letterhead, second sheets

and envelopes, the LaserPrinter E lets you add that, too.

Yet no matter how many features you add, the LaserPrinter E's unique stackable design takes up practically no

more desk space.

So whether your first requirement is affordability, performance or flexibility, the IBM LaserPrinter E should be at the top of your shopping list. See it today by calling 1-800-IBM-2468, ext. 982, for the name of your nearest IBM Authorized Remarketer.



Add HP NewWave to Windows and what do you get? Simply a breakthrough.



Windows 3.0 is a great step forward. It just doesn't go far enough. You still have to overcome barriers you thought you'd left behind. Such as DOS. The complexities of file management and application integration. And working in two environments.

The solution? Simply add HP NewWave. In this one simple step, you turn your PC into the most powerful, easiest-to-use information tool in business. To prove it, we've put an eye-opening, interactive demonstration on disk.

It shows how NewWave's simple object model lets you work on one

desktop environment, instead of having to use both the Program and File Managers. You don't have to understand the DOS file system at all. And it works with the Windows applications you already have.

Integrating NewWave applications is astoundingly simple. Just drag and drop. "Drill down" editing lets you make changes in part of a document, such as a chart, without leaving it. And with "hot links," your data changes automatically in all connected files.

To evaluate NewWave, call (408) 376-2727 for your interactive demonstration disk. (Handling charge \$3.95.) Then experience one of the most dramatic breakthroughs ever brought to your screen.



**HEWLETT
PACKARD**

PC FACT FILE

EDITORS' CHOICE

Arts & Letters

Computer Support Corp., 15926 Midway Rd., Dallas, TX 75244; 214-661-8960.

Formats: Arts & Letters (.GED)

List Price: Arts & Letters Graphics Composer, \$395; Arts & Letters Graphics Editor, \$695 (5,000 images).

In Short: Though the sticker price may look a little steep, this broad-range collection of good-quality color clip art offers plenty of value per image. The only drawback is its proprietary image format, but both collections give you the tools you need to export or paste the files into your applications.

CIRCLE 543 ON READER SERVICE CARD

blue-collar trades, and cartoons; they also include seasonal, scientific, and sports images and the maps and flags of most major western nations. Add to that a variety of symbols for flowcharts, office layouts, and charting aids, and it's hard to imagine a subject not covered in this library.

RETRIEVING THE IMAGE

To retrieve a clip-art symbol, you choose the symbol retrieval tool from the *Arts & Letters Graphics Editor's* toolbox, then enter the symbol number in the dialog box. This feels like a chore only for some of the more complex illustrations, which are made up of multiple, unrelated symbol numbers that you must enter individually, building the image layer by layer.

You bring clip art into the workspace with fills in the "current" color or pattern. You can easily recolor objects with colors from palettes in any of three color

GRAPHICS

VECTOR CLIP ART

models or using bitmapped or vector patterns. The palettes are arranged and named logically. Among the choices are People (skin and eye colors), Building Materials (asphalt, brick, steel), and Food (broccoli, chocolate), all of which are printed on a handy reference card to aid in color matching. Once you've finished with the fills, you can align and group the components of the picture using menu items.

A PASTE-UP PRO

One of the great advantages that *Arts & Letters* offers is the Editor's ability to combine elements imported in various formats together with clip art and text entered by A&L's text editor. These can be exported in CGM, EPS, TIFF, or SCODL formats, or copied to the Windows clipboard for pasting into other Windows applications. We encountered some problems exporting the images to CorelDRAW in CGM and EPS format, however. CGM elements split between fills and outlines, a fault of the A&L CGM export filter, and Corel was not able to interpret the color characteristics of the EPS files properly. But copying via the clipboard went smoothly.

An anticipated upgrade of *Arts & Letters Graphics Composer* will include the ability to stretch, rotate, flip, and slant the clip art; it will have the same import/export capabilities of the Graphics Editor but not its sophisticated graphics editing, bitmap tracing, and illustration features. With either option, *Arts & Letters* clip art is economical on a price-per-symbol basis. Overall, its high quality and breadth of coverage make it a worthwhile purchase.

ARTWARE SYSTEMS INC.

ArtWare Graphics Pak

by David Dean

Need to put together a flier for your Valentine's Day sale or an advertisement for your shop? How about a pamphlet explaining your organization's goals and achievements? If you have a small business or organization, ArtWare Systems' *ArtWare Graphics Pak* may have everything you need to spice up your presentations and advertisements.

For \$129.95, the nine libraries in *ArtWare* offer a wide range of EPS clip-art images aimed primarily at small-business applications. Other vendors have licensed these images for inclusion in CD-ROM libraries. Since *ArtWare* libraries are not sold separately, ArtWare Systems plans to add to its 255 images with new Paks. First in the offering is an equestrian library.

ArtWare groups images by library and disk number in an easy-to-use catalog. The image names logically match the description in the catalog, but no exact filename is listed. No image-management software comes with it, either.

The 255 images in the nine libraries cover a wide range of subjects, including Business, Borders, Communications, Dingbats, Health & Medicine, Seasonal, Sports, Symbols, and Travel. The Borders collection, which includes full portrait and landscape ornamental borders, corner epaulettes, and circular wreath frames, is the largest library. The Symbols library, which includes arrows, credit cards, drugstore images, money, and political images, is also very strong.



Arts & Letters is one of the most comprehensive clip-art libraries available. Its collection of high-tech images is both large and of high quality.

PC FACT FILE

ArtWare

Graphics Pak

ArtWare Systems Inc., 6512 Six Forks Rd., Unit 502A, Raleigh, NC 27615; 919-870-9593.

Formats: EPS

List Price: \$129.95 (255 images).

In Short: The 255 EPS images in the nine *ArtWare* libraries cover a wide range of subjects but are sorely lacking when it comes to business images.



CIRCLE 544 ON READER SERVICE CARD

Introducing the new It will create your next Not to mention



Automated Smart Features make it easier than ever to produce everything from simple word charts to impressive flow charts, diagrams and other business drawings.

The new Freelance Graphics for DOS offers a WYSIWYG (what-you-see-is-what-you-get) environment where you work with actual colors and fonts while you're creating your graphics. And with the mouse you can do it all in record time.

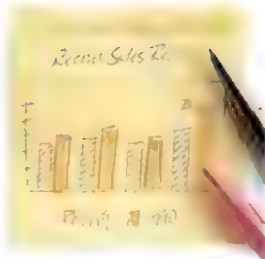
Freelance Graphics. presentation beautifully. automatically.

Now there's an even better version of Freelance® Plus, the award-winning graphics program praised by *PC Magazine*, *PC World* and *Software Digest*. It's so improved, in fact, we even changed its name. Introducing Freelance Graphics™ 4.0. The best presentation graphics program for DOS.

For starters, we've added a graphical WYSIWYG environment. Which means you'll work with actual colors and fonts while creating your graphics. Plus, you'll know what your output



For two consecutive years, Software Digest awarded Freelance Plus its highest-rating. With Freelance Graphics, we've made the best even better.



Only Freelance Graphics, with its unique automated Smart Features, can turn your rough ideas into a smooth presentation this easily.



will look like before you print.

And with the mouse you'll do it all—from executing menu commands to moving a chart—in record time.

Yet what's really unique about the new Freelance Graphics is its *Smart Features*. Unlike other DOS graphics programs, its hard-working *Smart Features* automate

the process of

turning your ideas into persuasive presentations. So while you're concentrating on what you want to say, Freelance Graphics will take care of how it looks. Whether you're creating slides, overheads, or hard copy, in color or black-and-white.

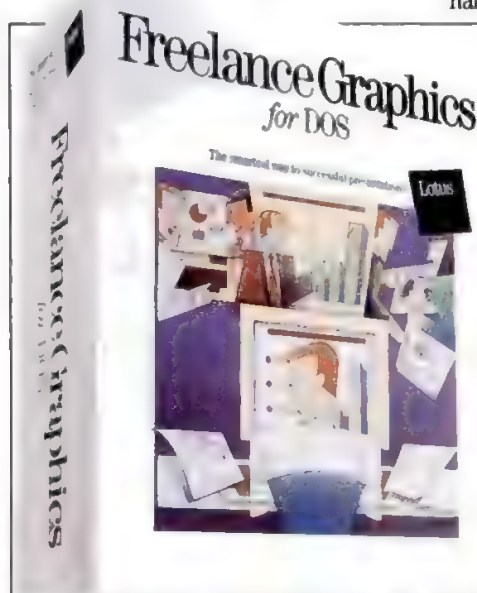
Here are a few of its *Smart Features*:

Portfolio, a built-in presentation manager, helps you organize and prepare your presentation: A **Text Chart Outliner**, complete with a spell-checker, creates stacks of text charts in seconds; **Auto-charting** makes weekly or monthly reporting a snap by printing hundreds of up-to-date charts with a single command; **Smart Chart Update** automatically recomposes a chart whenever the data changes... even if you've added annotations or symbols; and over 1,000 **Pre-drawn Symbols and Design Backgrounds**.

All of which means you can now create an incredibly impressive presentation. With incredible speed and ease.

The new Freelance Graphics.

It could actually have you looking forward to your next presentation.



Upgrade to Freelance Graphics now and you won't just save time. You'll save money.

Right now we're offering—direct from Lotus®—a price of just \$99.00* for anyone upgrading from an earlier version of Lotus Freelance or Graphwriter, or any other eligible[†] graphics program, including Harvard Graphics.

Plus, you'll be covered by the **Lotus Technology Guarantee**. Which means a guaranteed price of just \$49.00 on our upcoming Freelance Graphics for Windows™ product.

For information or to purchase your upgrade directly from Lotus, call **1-800-TRADE UP**, extension 1095. Please have your credit card and eligible product package ready when you call.

*Developed by Symantec Corporation, especially for Freelance Graphics. Offer expires September 30, 1991, after which the Lotus direct upgrade price will be \$119. †Eligible products for upgrade offer include all versions of the following products: Lotus Freelance Plus or Graphwriter, Harvard Graphics, Draw Perfect, Applause II Draw, Applause Graph Plus, Charisma, Microsoft Chart, Pario, Gem Series, ChartMaster, Diagram Master. *Freelance Graphics 1 panels also available at participating Lotus resellers.

Freelance Graphics for DOS



GRAPHICS VECTOR CLIP ART

WEAK ON BUSINESS

Unfortunately, the Business library has only five true business images, though several additional business images are scattered across the other libraries. Surprisingly, there are five full world and U.S. maps in this library as well. However, the U.S. map is not well done. As a native of Cleveland, I did not find Lake Erie's flooding of Toledo too troubling, but these kinds of inaccuracies are magnified when you try to label or

otherwise identify cities or regions.

Editing or shading individual objects in many of the images is troublesome, especially as some objects are unexpectedly open-ended. When you try to color one of these images, the color keeps filling space until it finally encounters a boundary. Light line weights are another general problem that seems to occur throughout *ArtWare*. Changing the line



Many of the images in *ArtWare Graphics Pak* suffer from light line weights and artifacts.

weight is a fairly straightforward procedure, but deciding which lines to emphasize is tricky and time-consuming. You cannot merely increase all of the line weights by a set amount; if you do, you can wind up with a face that has outlines of equal thickness for lips, hair, eyes, ears, and nose—not a pretty picture. And while shading (including the use of gradients) is usually perfect, parts of lines that should be continuous tend to drop out when output to a LaserJet.

Many of these black-and-white images show imagination and not only function well, but add spice to your documents. Most of the drawings can be used as is, but customizability suffers since the objects often have open sides.

ArtWare Graphics Pak has a useful variety of images, but it's lacking in such things as office scenes, buildings, professionals at work, more communications machinery, and PC imagery. These omissions make *Artware* a less than stellar choice for anyone who uses clip art to spruce up business presentations. But if your needs are oriented more toward the small-business advertisement or flier, *ArtWare* might just suit you.

Advanced Printer Sharing at Half the Cost.

With SmartPrint, it's as though each computer has its own printer. SmartPrint allows several computers to share any printer automatically. It operates transparently, so you work exactly as before.

While other printer sharing devices use expensive yet limited RAM buffers, SmartPrint lets you work smarter by using advanced spooler software that buffers work to your hard disk, eliminating the chance of lost data or system hang-ups.

And, our advanced circuitry allows extra long cable lengths from each

computer (up to 50 ft. parallel, 1,000 ft. serial).

SmartPrint is a snap to install, too. Just connect your computers and printer to SmartPrint using standard cables and you're ready to go. That's all there is to it. And SmartPrint is Hewlett-Packard and FCC approved.

And now there's a new version of SmartPrint—The Multi Printer Switch. It lets you connect up to 5 printers to 2 computers. And since it has its own microprocessor, either computer can use any of five printers and it's LAN compatible, too.

Smart technology. Smart Price. It's called SmartPrint.

PRINTER SHARING SYSTEM

Model	Computers	Type	Price
PSS-P2	2	Parallel	\$129
PSS-P4	4	Parallel	\$199
PSS-P6	6	Parallel	\$229
PSS-S4	4	Serial	\$199
PSS-S6	6	Serial	\$229

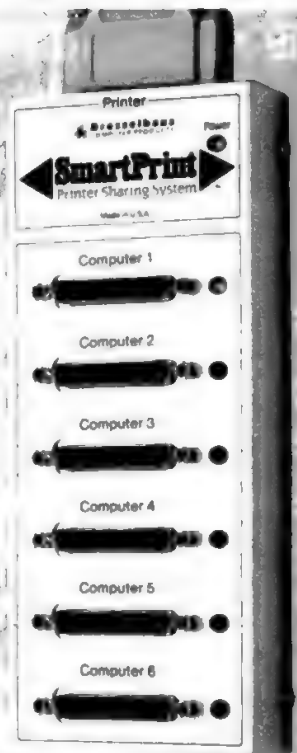
MULTI PRINTER SWITCH

Model	Computers	Printers	Price
MPS	1Par/1Ser	4Par/1Ser	\$249



Dresselhaus
COMPUTER PRODUCTS

8560 Vineyard Avenue, Bldg. 405
Rancho Cucamonga, CA 91730
(714) 945-5600/FAX: (714) 989-2436



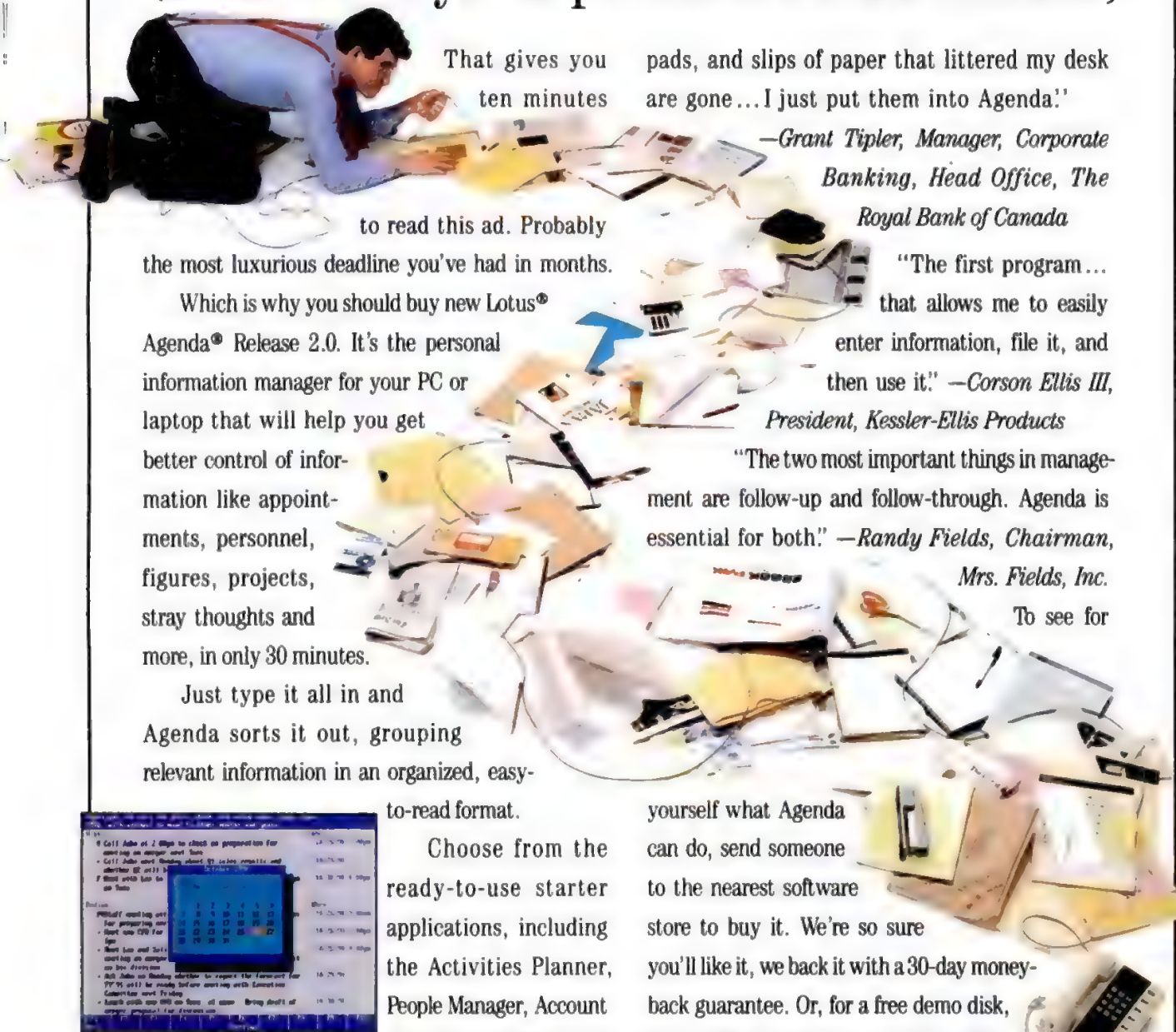
SmartPrint

Printer Sharing System™

SmartPrint is distributed by Ingram Micro D and can be found or ordered at most computer stores, including Computerland, CompuCom, Connecting Point, Egghead, Entre, 47th Street Computer, Inacomp, Jade, Microage, PC Warehouse and Softwarehouse. Call 1-800-368-7737 for the store nearest you.

How to get your life organized in 40 minutes, guaranteed.

(30 minutes if you skip ahead to the 800 number.)



That gives you ten minutes

pads, and slips of paper that littered my desk are gone...I just put them into Agenda.'

—Grant Tipler, Manager, Corporate Banking, Head Office, The Royal Bank of Canada

to read this ad. Probably the most luxurious deadline you've had in months.

Which is why you should buy new Lotus® Agenda® Release 2.0. It's the personal information manager for your PC or laptop that will help you get better control of information like appointments, personnel, figures, projects, stray thoughts and more, in only 30 minutes.

Just type it all in and Agenda sorts it out, grouping relevant information in an organized, easy-

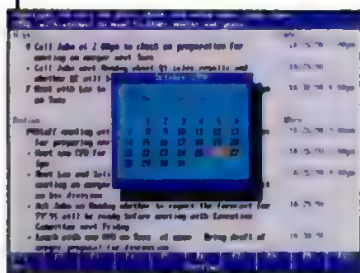
to-read format.

Choose from the ready-to-use starter applications, including the Activities Planner, People Manager, Account Manager or Information Sifter. Or

yourself what Agenda can do, send someone to the nearest software store to buy it. We're so sure you'll like it, we back it with a 30-day money-back guarantee. Or, for a free demo disk, call 1-800-842-8455, extension 931.

Finally, a word to everyone who read this ad all the way from the beginning.

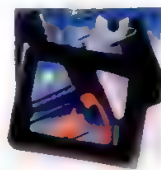
Your ten minutes are about up. Get back to work.



Lotus Agenda 2.0 is so easy to work with you'll start getting better control of your professional life within 30 minutes.

customize applications for more specific needs. If it all sounds too good to be true, consider what these Agenda users have to say: "All of those notes,

Lotus Agenda



Introducing New Lotus Agenda 2.0

GRAPHICS VECTOR CLIP ART



FACT FILE

Click & Clip 500
Studio Advertising
Art, P.O. Box
43912, Las Vegas,
NV 89116;
702-641-7041.
Formats: EPS
List Price: \$395
(500 images).

In Short: These graphically simple, well-constructed images are ideal for an amateur DTP person but lack the imagination and detail to appeal to a sophisticated designer.



CIRCLE 548 ON READER SERVICE CARD

STUDIO ADVERTISING ART Click & Clip 500

by Rob Smith

At a time when clip-art images are becoming ever more detailed and complex, *Click & Clip 500* is something of an anachronism. This package strives to maintain a graphically simple approach to canned art and succeeds at meeting its goal.

The *Click & Clip 500* collection (\$395) is contained on 30 floppy disks and comes with its own plastic storage case. There is a potpourri of images here, including headlines, seasonal elements, decorative borders, graphic symbols, active and historic figures, maps, currency, and a wide variety of everyday objects. The business images tend to be very generic: There's only one computer image here and no office-furniture images.

The EPS images are catalogued alphabetically and range in size from 5K to 75K. Each image is stored in its own file and must be accessed individually, but a 2- by 3-foot poster is supplied for reference. Unfortunately, a poster with 500 images on one page does not lend itself to a quick scan to find the image you're looking for. Instead, you'll need to review the index, then take a slow meander through the somewhat confusing arrangement of the files on disk.

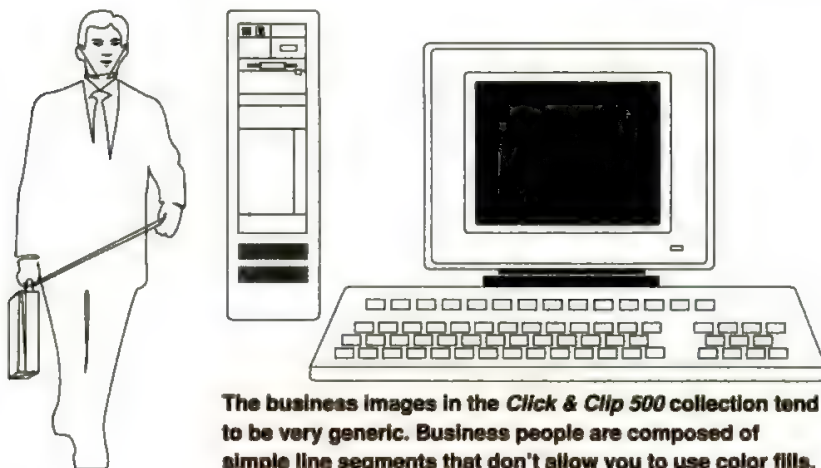
The package also includes a 21-page pamphlet that gives tips for creating custom images, using backgrounds, and more.

IMAGE EDITING

Objects and simple line drawings are logically constructed, with an ample number

of nodes to make editing and combining images easy. Even borders may be disassembled and resized without distortion. However, some images are too simple and provide little inspiration for customizing. Human figures, for example, are composed of simple line segments that do not allow for applying tints or color fills. Other images are nothing more than cartoonish, two-dimensional wireframes that lack perspective and shading.

Still, some images—like a zipper and a banker's lamp, both of which use perspective and tint fills—are highly stylized and show a great deal of imagination. Strong silhouette graphics, such as a chef and the Statue of Liberty, are at once contemporary and timeless. Overall, there's a wide variety of quality in this package, ranging from typical cartoony images to more complex realistic attempts.



The business images in the *Click & Clip 500* collection tend to be very generic. Business people are composed of simple line segments that don't allow you to use color fills.

Click & Clip 500 offers images that will serve admirably for the amateur DTP person who wants to create snappy newsletters, flyers, newspaper ads, or other promotional material. These files are neither overly complex or difficult to handle and are reasonably priced. However, the more sophisticated professional designer will find that the images fall short in detail and imagination.

T/MAKER CO.

ClickArt EPS

by Paul Murphy

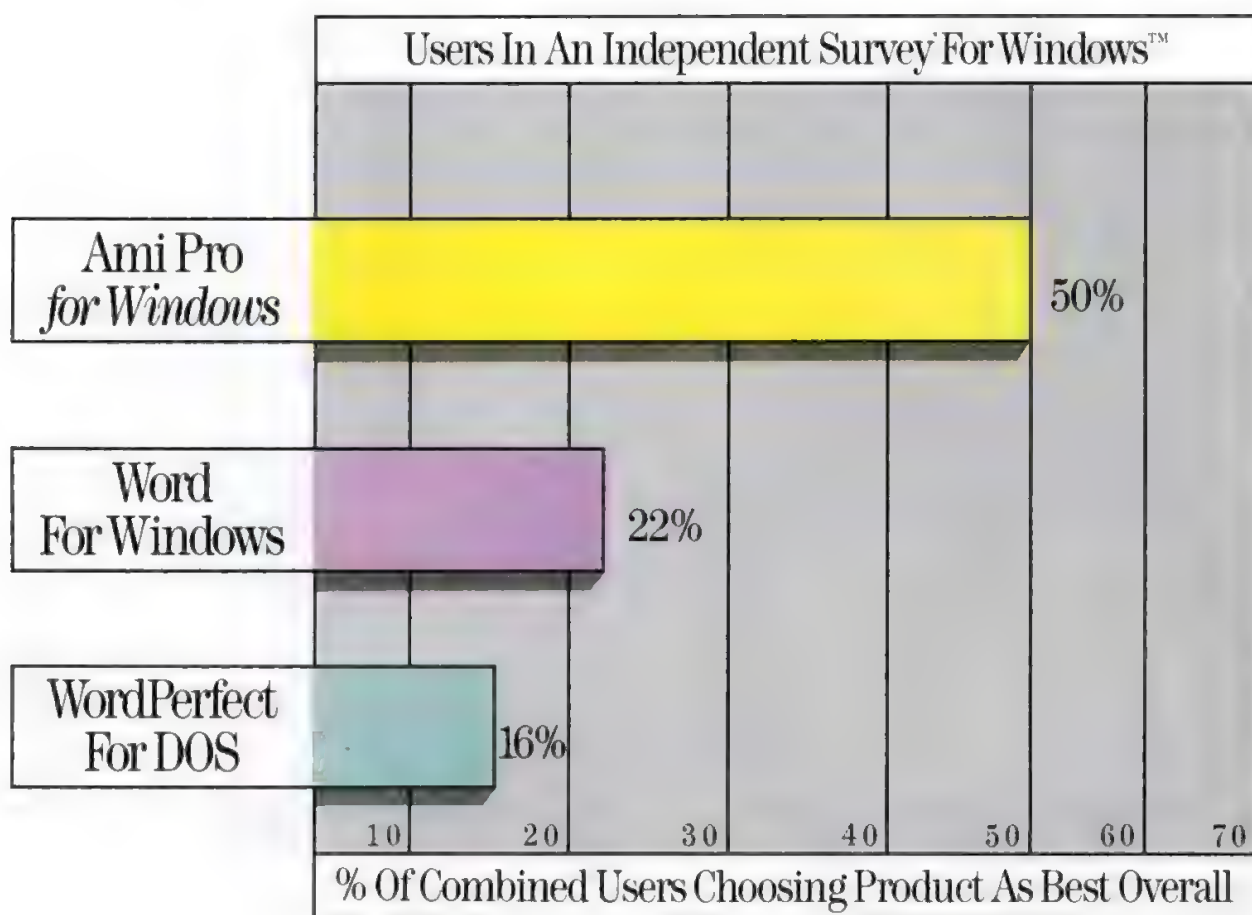
When the images you use are as important to your presentation as the information you're illustrating, turn to *ClickArt EPS*. The majority of the images in these \$129.95 packages are so high in quality that even the pickiest presenters will be pleased to call them their own.

These packages are grouped into five logical (though not comprehensive) collections: Business Art, Symbols and Industry, Illustrations, Animals and Nature, and Sports and Games. Although the Symbols and Industry package includes a broad range of symbols for technical and industrial use, roughly half of the images are oriented to military applications. Many of the images in the Sports collection are attractive representations of athletes in action, but T/Maker also includes a large number of iconic flags representing games and recreational activities that have only limited appeal. Missing from *ClickArt EPS* are government and holiday images; the package also lacks a broad range of transportation symbols.

ClickArt EPS does not furnish software for displaying or retrieving the images, so you'll have to rely on the printed manual that accompanies each package to find the image you need. This manual provides a thumbnail of the image and its filename, but the index is unnecessarily complex, listing references to both Mac and DOS versions.

Many of the images are exceptionally eye-catching and make imaginative use of gray scales, including gradient fills, which give objects from sports cars to sports figures impressive depth and perspective. But the images are not consistently striking, and many are simply silhouettes. They do, however, print very impressively on non-PostScript laser printers.

Ami Pro From Lotus Is Impressing Some Very Important People.



*Independently conducted Windows word processing Usage & Attitude Study, November, 1990. Figures cited are among Word for Windows users that are also users or triers of Ami Pro.

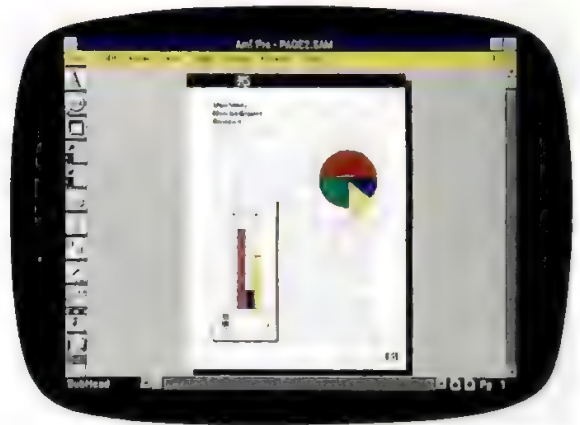
Users are raving

Preferred nearly 2:1
for quality of output.



Try Ami Pro™ for Windows™ just once, and you'll see why users prefer it by such wide margins over other word processors. With more than 360 powerful features, and its incredibly flexible formatting tools, it's not surprising that Ami Pro has unmatched quality in printed output.

Preferred more than
2:1 for ease of use.



Only Ami Pro makes word processing this easy, with features like truly interactive WYSIWYG that lets you edit in any of four page views, including full page view.

Preferred nearly 2:1
for productivity.



With all the features of a serious word processor, Ami Pro even comes with over two dozen pre-set style sheets for fast, professionally designed letters, reports, memos and more.

Preferred more than 10:1
for graphics generation.



With its built-in graphics Ami Pro can instantly generate 168 varieties of presentation-quality charts and graphs. Just type in data, or import it from programs like Lotus® 1-2-3®.

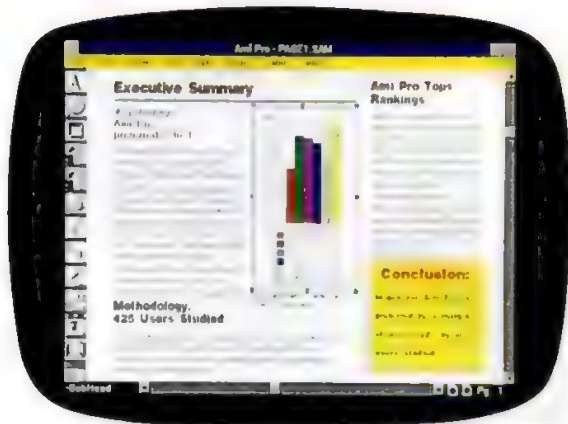
about Ami Pro.

Preferred nearly 2:1
for ease of learning.



Since it works like you think, Ami Pro is a snap to learn. Friendly, interactive Dialog Boxes display all your layout options—and show you results of commands *before* execution.

**Preferred nearly 3:1
for format flexibility.**



Our exclusive "frames" feature lets you quickly place headings or graphic elements anywhere on the page—then wrap text around them with one click of the mouse.

And so are
the experts.

With user preference this high, it's no surprise that Ami Pro has also received top ratings from virtually all the industry experts.

PC Magazine says, "Of all GUI word processors, Ami Pro has the widest variety of features and is perhaps the most enjoyable to use."

Software Digest feels, "Top scores

for learning and use put Ami Pro comfortably ahead of other programs."

And PC Computing calls Ami Pro
"a stunning achievement."*

To find out more about the word processor that's making quite an impression—and how easy it is to try it yourself, just turn the page.



You'll Be Impressed, Too.

Automatic Backup

Automatic Timed Save

Block Manipulation

Bookmarks

- Named By User • Go To

Charting

- 3D Charting • Edit Chart with Draw Tools
- Legends • Multiple Styles Per Type • 7 Chart Types

Copy Text and Graphics

Cursor Movement

- Begin/End of File • Character • Line • Page
- Paragraph • Sentence • Top/Bottom of Screen • Word

Customizable Icon Bar

- Choose From Over 45 Functions • Quick Access to Features

Customizable View Level

- 10-400% • Fully Editable

Cut and Paste

Date Insertion

- Today's Date • Date Printed • Date Last Edited • Definable Style

DDE (Dynamic Data Exchange)

- Two-way • Paste Link • Text and Graphics
- Via Macro Language

Defaults

- Backup Options • Date Styles • Dictionary Paths • Display Options • Document Path
- Draft Mode Colors • Footnote Options
- Hyphenation Hot Zone • Pair Kerning • Printer
- Icon Bar Icons • Undo Levels • View Level

Delete

Dialog Boxes

Document Annotation

- Notes • Show/Hide • Go To Notes • Date/Time Stamp • Stacked Notes

Document Descriptions

- Author Name • Operator Name • Revision Number • Creation Date • Revision Date
- Renameable Fields • User Defined Fields
- Display with Directory • Print with Document

Drawing

- Cut/Paste Objects • Circles • Arcs • Squares
- Rectangles • Rounded Boxes • Diagonals
- Polygons • Polyines • Group Objects
- Snap-To Grid • Fill Patterns • Line Widths
- Text Rotation • Type Text

File Import/Export

- AdvanceWrite • ASCII • DBase • DCA Final Form • DCA Reversible Form • DIF • E-Mail
- Enable • Lotus WKS WK1 WK3 • Microsoft

- Word • Microsoft Word for Windows • Multi-mate • Navy DIF • Peachtext • Rich Text Format • Samna Word • Windows Write
- WordPerfect • WordStar • Wordstar 2000

File Management Functions

- Copy • Rename • Delete • Move • Sorted File Listing

Font Control

- Unlimited Number of Fonts • WYSIWYG
- Limited Only by Printer

Footnotes

- Auto Numbering • Bottom of Page • Endnotes • Number Style Option • Reset Number Option • Separator Line

Forms Capability

- Format Complicated Forms • Fill-In-On-Screen
- Print on Preprinted Form • Protect Areas

Frames

- Anchor to Text • Auto Text Wrap Around
- Background Shade • Contain Text or Graphics • Fixed Position On Page • Lines Around • No Text Wrap Around • No Text Wrap Beside • Overlay Frames • Repeat on Multiple Pages • Resize Frames

Glossary

- Large Record Size • Speed Key Access

Go To

- Any Page Number • Fast Next Item Access
- Go To Frame • Footnote, Note Various Marks in Document

Graphics Control

- Edit PIC Files • Drop Anywhere on Page
- Float Graphic w/Text • Place in Box • Proportional Scaling • Fit in Frame • Rotate in Single Degree Steps • X-Y Scaling • Gutter/Binding Margins

Graphics Import

- CGM • EPS • HPGL • Lotus PIC • PCX
- TIFF • WMF

Hard Space

Headers/Footers

- Alternating • Floating

Help

- CBT Tutorial Available • Context-Sensitive
- Indexed • Point & Shoot • Hypertext Linked
- Full Macro Documentation On-Line

Hyphenation

- As-You-Type • Soft Hyphen • Consecutive Hyphen Control • On Paragraph Basis • Hot Zone

Image Processing

- Control Brightness/Contrast of Scanned Gray Scale TIFF Pictures • Sharpen Edges

- Smoothing • Invert Image

Index Generation

- Generate from List • Mark in Text • Multiple Level Indexing • Hyper Links from Index Back into Document

Insert/Typeover

Kerning

Line Numbering

Line Spacing Control

Macros/Programming Language

- On-Line Macro Documentation • Record/Play • Assign to Function Key • Assign to Menus • Create Menus • Variables • If • Go To Statements • Case Statements • For/Next
- Prompt for Input • Subroutines

Math Calculations

Measurements

- Centimeters • Inches • Picas • Points

Merge

- From ASCII Files • From Comma Delimited Files • From DIF Files • From WK1 Files • From dBase Files • From Ami Pro File • Label Print Function • Preview Before Print • Three-Level Boolean Conditional Record Inclusion

Open Multiple Documents

Page Breaks

- Manually Inserted • With Paragraph Style

Page Formatting Control

- Margins • Page Size • Snaking Columns
- Line Around Page • Line Between Columns
- Portrait/Landscape

Page Numbers

- Any Location on Page • Reset Page Number
- Five Formats for Number

Paragraph Styles

- Quick Access with Styles Box • With Function Key • Controls Font, Alignment, Spacing, Page Breaks, Ruling Lines, Bullets, Numeric Format in Table Hyphenation

Printing Color

Print Options

- Over 130 Printers Supported • Number of Copies • Page Range • Reverse Order
- Collate • Print Document Description • Crop Marks • On Preprinted Form • Printer Bin Control for First/Rest Pages • Portrait or Landscape

Real-Time Pagination

Revert to Saved Version

Search and Replace

- Case Insensitive • Forward or Backward
- Header/Footer/Footnote • Skip • Replace

- Replace All • Search for Style • Search by Attribute • Wildcards

Section Outline Numbering

- 6 Levels • Number Paragraphs • Numbered Lists • User-Defined Reset

Snaking Columns

- Up to 8 Columns • Column Balancing • On Screen • Variable Width • Variable Spaced

Sort

- Alphabetic • Numeric • Ascending • Descending • By Paragraph • By Word • By Number of Lines • 3 Levels—3 Words Within each Level

Spelling Check

- 130 000 Word Dictionary • Add to Dictionary
- Correct Multiple Occurrences • Entire Document • Selected Text • International Dictionaries • Rest of Document • Skip All Occurrences • Statistics Report • Unlimited User Dictionary Size

Status Line

- Column Number • Document Name • Insert/Typeover • Line Number • Page Number

Style Sheets

- 27 Professionally Designed • Control All Formatting in Document • Document-Only Styles • Global Styles

Tables

- Up to 256 Columns • Column Width Control
- Row Height Control • Auto Row Height
- Lines around Cells • Shaded Cells • Connected Cells • Formulas • Four-Function Math, Sum Function, Absolute/Relative Cell Address
- Insert Rows and Columns • Numeric Alignment and Formatting

Table of Contents

- 3 Levels • Separator Choice

Tabs

- Center • Leader Dot • Left • Numeric • Right

Text Enhancements

- Bold • Double Underline • Initial Caps • Italic
- Lowercase • Overstrike • Small Caps • Subscript • Superscript • Underline • Uppercase
- Word Underline

Thesaurus

- 14 Million Alternatives • Definitions • Gives Inflections • Synonyms

Undo

- Four-Level • Customizable
- Unlimited Document Size**
Vertical Centering
Widow/Orphan Control
Word Count

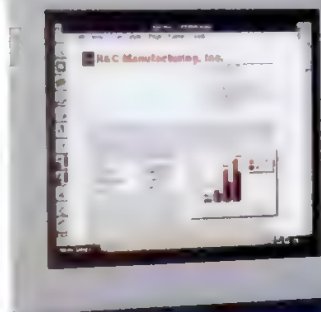
Ami Pro

for Windows

The easiest-to-use, top rated Word Processor



Ami Pro



Now you can give Ami Pro a try free.

With all these advanced features, you couldn't ask for a more powerful or easier to use word processor than Ami Pro. But you could ask for a free fully functional working model**— just by dialing our toll-free number.

Slip it into your PC, and experience the power of a serious word processor, plus built-in graphics you won't find anywhere else. Even if you don't have Windows yet, our working model with its own Windows driver will show you what you're missing. So go ahead and impress yourself, call **1-800-831-9679** (1-800-668-1509 in Canada) now.

Ami Pro for Windows
from
Lotus®

©1991 Lotus Development Corporation. All rights reserved. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. Ami Pro is a trademark of Samna Corporation, wholly owned subsidiary of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation. All other trademarks are the property of their respective holders.

*Reprinted from Software Digest April 1990 ©1990 NSTL Inc. PC Magazine July 1990 ©1990 Ziff Communications Co. **The working model comes with its own Windows demo version and lacks some features including thesaurus, spell checker and ability to save files.

CIRCLE 143 ON READER SERVICE CARD



The images in the *ClickArt EPS* library are attractive, but uneven in their editability. The businesswoman can't be recolored without complex node and line editing, but the 3-D map of the United States is well constructed.

UNEASY EDITING

The *ClickArt EPS* files are economical in their use of line and curve segments. Complex parts of illustrations contain a relatively low number of nodes, which means an economical use of disk space but not necessarily easy editing. For example, the image of a businesswoman is attractively composed, but her dress and hair are a single closed object that cannot be recolored without complex node and line editing. And many images can be much tougher to edit than you'd first imagine. For example, a detailed image of a computer contains several underlying subgroups of objects that are a nuisance to isolate and ungroup.

A 3-D map of the United States, though not very detailed, is constructed so that each state is a separate object and can be

easily recolored. You won't find a map of Europe in this package, although *T/Maker* expects to release a collection of maps, including a European map with a unified Germany, by the time you read this review.

The *ClickArt EPS* images may not always be easy to work with, but they run circles around CGM images in ease of use and are generally higher in quality. The bottom line is that *ClickArt EPS* is a smart buy if you don't need too wide a variety of subjects.

C.A.R. INC.

Clipables: The EPS Graphics Library

by Michael Graham

If you're looking for an economical clip-art package with a variety of images, consider *Clipables: The EPS Graphics Library*. After enjoying a year and a half in the Macintosh market, *Clipables* (\$149.95) comes to the PC market with nearly 600 hand-rendered EPS images spread over 18 3.5-inch or 5.25-inch floppy disks.

The images cover a diversity of subjects, each arranged in its own folder. Animals, Dingbats (three disks' worth), Display Banners, Famous People, Maps, Humor, and Transportation are some of the folders. In addition, there are three disks of business images. Unfortunately each folder contains only a few images,

and in the case of the business folders, these tend to be very generic (file cabinets, light switches, some business people). None of the folders offers any real variety of images.

Clipables also exhibits a diversity of well-executed artistic styles ranging from flat line art to silhouette, from black-and-white to gray-scale halftones, from cartoon-like to realistic, from humorous to serious, and from simplistic to detailed. Finding these images is easy since each of the disks is alphabetically and numerically labeled to correspond identically to *Clipables'* pictorial index or catalog. Unfortunately, the images are not necessarily on the disk you'd expect them to be. For example, the only image of a computer is located on one of the dingbat disks.

HIGH MARKS FOR EDITING

Technically, *Clipables* scores high marks. Each object in the library is well structured, using a sufficient number of objects and editable nodes. The elements are clear and precise, and the files neither too large or burdensome to be easily redrawn, exported, or placed in your layout. Reshaping, sizing, cropping, and printing are discussed in the user manual, and coloring the black-and-white images is fun.

Gradient fills are actually made up of a series of banded gray-scale elements. With the proper devices, though, printer output is so sharp that even at 300 or 600 dpi, printed images strongly resemble catalog and screen images. At over 1,000 dpi, output is merely icing on an already tasty cake.

By the time you read this, there should be an additional release of *Clipables* with over 700 original elements, including



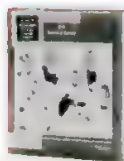
ClickArt EPS

T/Maker Co., 1390
Villa St., Mountain
View, CA 94041;
415-962-0195.

Formats: EPS

List Price: \$129.95 per volume. EPS
Business Art (200 images); EPS Animals and
Nature (150 images); EPS Sports and Games
(180 images); EPS Illustrations (175 images);
EPS Symbols and Industry (260 images).

In Short: Though these images are high in
quality and relatively easy to use, the
collection lacks the variety necessary to make
it a real standout.



CIRCLE 546 ON READER SERVICE CARD



Clipables: The EPS Graphics Library

C.A.R. Inc., 7009
Kingsbury Blvd., St.
Louis, MO 63130;
800-288-7585, 314-721-6305.

Formats: EPS

List Price: \$149.95 (582 images).

In Short: For the economical artist, the variety
of subjects and artistic styles make this
collection a wise choice. Unfortunately, the
business images tend to be generic, offering
very few variations on a theme.



CIRCLE 547 ON READER SERVICE CARD

246

CHISEL

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

chloro-ro-sis (klə rō'sis) *n.* [ModL: see CHLOR (O)- & -OSIS] 1 an abnormal condition of plants in which the green parts lose their color or turn yellow as a result of a lack of chlorophyll production due to disease, lack of light, etc. 2 a form of iron-deficiency anemia sometimes affecting girls at puberty and causing the skin to turn a greenish color — **chlor-rot'ic** (-rāt'ik) *adj.*

chloro-thia-zide (klōr'ō thī'ā zid') *n.* [CHLORO- + THI- + AZ- + -IDE] a synthetic drug, C₇H₆CIN₂O₅S₂, used in treating hypertension, heart failure, or various edemas by removing extra salt and water through the kidneys

chlor-rous (klōr'əs) *adj.* 1 of or containing trivalent chlorine designating or of an unstable acid, HClO₂, a strong oxidizing agent which exists only in solution and whose salts are known as chlorates

chlor-pic'me-zine (klōr pik'r'in) *n.* CHLOROPICRIN

chlor-prom'e-tazine (klōr prām'ē zēn') *n.* [CHLOR (O)- + promaz- + -INE] a synthetic compound, (C₁₇H₁₉)N₂S, contr. < promethazine, an antihistaminic drug

(phenothiazine) (phē'nō-thīāzēn) *n.* [PHENO- + THIAZINE] a synthetic compound, (C₁₅H₉N₃S), contr. < PHENO- + THIAZINE] a synthetic compound, (C₁₅H₉N₃S), used to treat certain mental disorders and to cause nausea and vomiting

***chlor-tetra-cy-cline** (-tē'trə sī'klin, -klin') *n.* [CHLOR(O)- + CYCLINE] a yellow antibiotic, C₂₂H₂₀CIN₂O₈, isolated from a variety of bacterial and rickettsial infections and certain organisms (*Streptomyces aureofaciens*): it is used against chm or chmn chairman

Rufus 1799-1859; U.S. lawyer NormFr choqué, a block < Gaul *tsukl- (choť), stump; for IE base see STOCK barrel, etc. to keep it heavy metal fitting

it's easy to make chocolate moose.

FLOR (o) & -OSIS | 1 an
green parts lose their
yll production due to
on-deficiency anemia
sing the skin to turn a

IO + THI + AZ + IDE |
reating hypertension,
g extra salt and water

2 trivalent ch
Stim-

247

chlorosis / cholinesterase

chock-a-block (-a bläk') *adj.* [see prec & BLOCK] 1 *Naut.* a) pulled so
tight as to have the blocks touching (said of a b) g tackle) b)
hoisted all the way up, ad a signal flag 2 -
tightly together
chock-full (chäk'fool') -
cheke, cheek +
full as -

< choke.
[HOKE] as

12 via Fr
powder
ted and
J sugar
-adj.
oc'o-

chlorosis / cholinesterase

ck-a-block (-a bläk') *adj.* [see prec. & BLOCK] 1 *Naut.* a) pulled so
tight as to have the blocks touching (said of a hoisting tackle) b)
hoisted all the way up, as a signal flag 2 crowded or jammed -*adv.*
tightly together
nock-full (chäk'fool') *adj.* [ME *chokkeful*, *chekefull* < choke.
cheke, cheek + -ful, -FUL; now often assoc. with CHOCK, CHUCK] as
full as possible; filled to capacity
choco-late (chök'lat, chäk'-) *n.* [? via Fr
chocolat < Sp *chocolate* < Nahuatl *çōkōlātl*] 1 a paste, powder
syrup, or bar made from cacao seeds that have been roasted and
ground 2 a drink made of chocolate, hot milk or water, and sugar
3 a candy made of or coated with chocolate 4 reddish brown -*adj.*
1 made of or flavored with chocolate 2 reddish-brown -*choc'o-*
laty or *choc'o-latey adj.*

chocolate moose /c'hak-(e)let/mus/n, pl moose: a large
member of the elk family
dipped in chocolate.
cho-co-la-lier (chō'kə lə tir') *n.*
a maker or seller of chocolate
candies, esp. fancy or expensive
ones

Choc-taw (chäk'tō') *n.* [Choctaw
chahta, a self-designation] 1 *pl.*
-taws' or -taw' a member of a
North American Indian people
who lived in S Mississippi,
Alabama, Georgia, and Louisiana
and now live in Oklahoma and
Mississippi 2 the Muskogean
language spoken by this people
choice (chois) *n.* [ME & OFr
choisir, to choose <
to taste, test; see



chocolate moose 1

able part 5 a variety
an alternative
rior

text scanning software, AccuScan,
simplifies the scanning process
by recognizing the layout of even
the most complicated material.
Including multi-column pages
and numerical tables. AccuScan
automatically separates text from
graphics, making it easy for you
to pick and choose the infor-
mation you want. An optional
twenty-page automatic document
feeder makes you even more
efficient.

The ScanJet Plus gives you a
head start. With one-button auto-
matic text scanning. Live preview
for instant feedback on image
quality. And auto exposure, which
works like a point and shoot
camera. To make things even
easier, it features on-line help.

HP has added all these impressive
capabilities to a scanner known
for its superior image scanning.
The ScanJet Plus reads 256 levels
of gray for smooth shading and
more realistic graphics.

At only \$2,190* the ScanJet Plus
makes perfect sense for any
business interested in being more
productive. And more profes-
sional. For more information and
the name of your nearest autho-
rized HP dealer, call 1-800-752-
0900, Ext. 1666. And even if you
never make chocolate moose,
you'll have a recipe for success.



HEWLETT
PACKARD

GRAPHICS

VECTOR CLIP ART



VECTOR CLIP ART: SUMMARY OF FEATURES

Products listed in alphabetical order

	ArtRight Image Portfolios	Arts & Letters	ArtWare Graphics Pak	Click & Clip 500	ClickArt EPS	Clipables: The EPS Graphics Library	Clippures	DeskTop Art
FILE FORMATS AND MEDIA								
Number of images in library	2,904	5,000	255	500	960	582	582	378
Vector formats	CGM, EPS, GEM, Micrografx, CorelDRAW	Arts & Letters	EPS	EPS	EPS	EPS	EPS	EPS
Bitmap formats	None	None	None	None	.PCX	None	None	TIFF, .PCX
Media:								
5.25-inch floppy disks	☒	☒	☒	☒	☒	☒	☒	☒
3.5-inch floppy disks	☒	☒	☒	☒	☒	☒	☒	☒
Macintosh	☒	☒	☒	☒	☒	☒	☒	☒
CD-ROM	☒	☒	☒	☒	☒	☒	☒	☒
SYMBOLS								
Business symbols:								
Buildings	☒	☒	☒	☒	☒	☒	☒	☒
Currency	☒	☒	☒	☒	☒	☒	☒	☒
Industry	☒	☒	☒	☒	☒	☒	☒	☒
Landscape	☒	☒	☒	☒	☒	☒	☒	☒
Office	☒	☒	☒	☒	☒	☒	☒	☒
People	☒	☒	☒	☒	☒	☒	☒	☒
Transportation	☒	☒	☒	☒	☒	☒	☒	☒
Organization charts	☒	☒	☒	☒	☒	☒	☒	☒
White-collar professions	☒	☒	☒	☒	☒	☒	☒	☒
Blue-collar professions	☒	☒	☒	☒	☒	☒	☒	☒
Publishing symbols:								
Arrows	☒	☒	☒	☒	☒	☒	☒	☒
Backgrounds	☒	☒	☒	☒	☒	☒	☒	☒
Borders	☒	☒	☒	☒	☒	☒	☒	☒
Bullets	☒	☒	☒	☒	☒	☒	☒	☒
Check marks	☒	☒	☒	☒	☒	☒	☒	☒
Dingbats	☒	☒	☒	☒	☒	☒	☒	☒
Drop caps	☒	☒	☒	☒	☒	☒	☒	☒
Headlines	☒	☒	☒	☒	☒	☒	☒	☒
Technical symbols:								
Anatomy	☒	☒	☒	☒	☒	☒	☒	☒
Architectural	☒	☒	☒	☒	☒	☒	☒	☒
Chemistry	☒	☒	☒	☒	☒	☒	☒	☒
Communications	☒	☒	☒	☒	☒	☒	☒	☒
Computer technology	☒	☒	☒	☒	☒	☒	☒	☒
Engineering	☒	☒	☒	☒	☒	☒	☒	☒
Flowchart	☒	☒	☒	☒	☒	☒	☒	☒
Greek alphabet	☒	☒	☒	☒	☒	☒	☒	☒
Tools and machinery	☒	☒	☒	☒	☒	☒	☒	☒
Personal-interest symbols:								
Animals	☒	☒	☒	☒	☒	☒	☒	☒
Appliances	☒	☒	☒	☒	☒	☒	☒	☒
Food	☒	☒	☒	☒	☒	☒	☒	☒
Furniture	☒	☒	☒	☒	☒	☒	☒	☒
Hobbies	☒	☒	☒	☒	☒	☒	☒	☒
Music	☒	☒	☒	☒	☒	☒	☒	☒
Nature	☒	☒	☒	☒	☒	☒	☒	☒
Sports	☒	☒	☒	☒	☒	☒	☒	☒

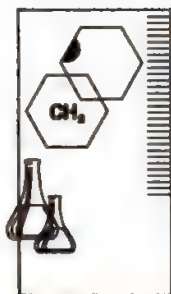
—Editors' Choice ☒ —Yes ☐ —No

GRAPHICS

VECTOR CLIP ART

Digit-Art	DrawArt Professional	ImageFile	 Images With Impact!	Micrografx ClipArt	Moonlight Artworks Collection	PicturePak	Presentation Task Force	ProArt Professional Art Library	Totem Color Clip Art
3,000 EPS	178 <i>GEM</i>	305 CGM, EPS, Micrografx	760 EPS	2,550 Micrografx	395 EPS	1,273 CGM	1,100 CGM, <i>Freelance</i>	1,200 EPS	1,344 EPS, <i>CorelDRAW</i>
TIFF	None	None	None	None	None	.PCX	None	None	None
☒	☒	☒	☒	☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐	☒	☒	☒	☒
☒	☐	☐	☒	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐	☐	☒	☒
☒	☐	☐	☐	☐	☒	☐			

GRAPHICS VECTOR CLIP ART



Clipables: The EPS Graphics Library displays a diversity of artistic styles ranging from flat line art to silhouettes.



1,300 EPS images for only \$399.

Clipables is a valuable software addition for anyone who enjoys having the freedom to add flourishes to an otherwise mundane-looking page. But it would be nice to have more variations on each image, as well as the chance to purchase some of these folders separately.

DREAM MAKER SOFTWARE Cliptures

by James Karney

For clean, simple, and fuss-free clip art, consider *Cliptures*. This three-volume collection of black-and-white PostScript art is aimed at users who want images that they can simply paste into newsletters and flyers. The images resemble traditional hard-copy clip art and are almost as easy



FACT FILE

Cliptures

Dream Maker Software, 7217 Foothill Blvd., Tujunga, CA 91042; 800-876-5665, 818-353-2297.

Formats: EPS

List Price: \$129.95 per volume. Volume 1 (Business), 148 images; Volume 2 (Business), 206 images; Volume 3 (Sports), 228 images. In Short: Though well crafted, these images are virtually uneditable, making them suitable only for those who favor the ready-to-clip.



CIRCLE 546 ON READER SERVICE CARD

additional medical and environmental images, business graphics, maps, flags, sports and holidays images, drop caps, and backgrounds, all with graphic design and paint tools. The entire library, old and new, will soon be available on CD-ROM, giving you a library of over

to place. Volumes are available individually in both DOS and Apple Macintosh formats for \$129.95 each.

Most of the EPS images are simple line drawings or silhouettes. The first two volumes, which focus on business topics, include line drawings of people, comput-



VECTOR CLIP ART: SUMMARY OF FEATURES

Products listed in alphabetical order



ArtRight
Image
Portfolios



Arts &
Letters

ArtWare
Graphics
Pak

Click &
Clip 500

ClickArt
EPS

Clipables: The
EPS Graphics
Library

Cliptures

DeskTop Art

SYMBOLS (continued)

Miscellaneous:

Cartoons (including balloons)	■	■	■	■	■	■	■
Elections	■	■	■	■	■	■	■
Flags	■	■	■	■	■	■	■
Government	■	■	■	■	■	■	■
Holidays	■	■	■	■	■	■	■
Military	■	■	■	■	■	■	■
Months	■	■	■	■	■	■	■
Politics	■	■	■	■	■	■	■
Religion	■	■	■	■	■	■	■
Road signs	■	■	■	■	■	■	■
Seasons	■	■	■	■	■	■	■
Time	■	■	■	■	■	■	■
U.S. maps	■	■	■	■	■	■	■
World maps	■	■	■	■	■	■	■

SOFTWARE AND DOCUMENTATION

Reference catalog	■	■	■	■	■	■	■
Retrieval by subdirectory	■	■	■	■	■	■	■
Thumbnail retrieval software	■	■	■	■	■	■	■
File-naming conventions:							
By symbol numbers	■	■	■	■	■	■	■
By logical names	■	■	■	■	■	■	■
Custom services:							
Subscription service	■	■	■	■	■	■	■
Scans and traces paper art	■	■	■	■	■	■	■
Creates new electronic images	■	■	■	■	■	■	■
Modifies existing electronic images	■	■	■	■	■	■	■
Creates custom collections	■	■	■	■	■	■	■
Downloads images by modem	■	■	■	■	■	■	■

■—Editors' Choice ■—Yes □—No

Trade in any old PC.



Now you can turn your outdated PCs into some great new PCs. And save \$500 on every one. With Digital's PC Trade-In Deal. Here's how it works.

Simply trade in any industry-standard PC. No matter who made it. And we'll give you \$500 off on a brand-new industry-standard PC from Digital. What a deal! And what a Digital PC you'll get!

The Digital PC family covers everything from our highly affordable 386sx-based machine, to a full range of 386's, to our high-performance 486. And you can take your pick of a complete range of top-quality, Digital-supported expansion options and peripherals.

So get in on the Digital Trade-In Deal. Just call 1-800-343-4040, Ext. 877. Or call your local Digital Authorized Distributor. Today.

And take \$500 off on a new Digital PC.



Digital PC Trade-In Selection Guide

	212LP	316sx	320sx	320+	325c	333c	425c
Processor	80286	80386sx	80386sx	80386	80386	80386	80486
Speed	12 MHz	16 MHz	20 MHz	20 MHz	25 MHz	33 MHz	25 MHz
Maximum Memory	16 MB	16 MB	16 MB	16 MB	16 MB	16 MB	16 MB
AT/XT Slots	3	3	3	6	6	6	6

digital™

DYNAMIC GRAPHICS DeskTop Art

by David Foster

If you're not ready to commit to a full clip-art library—or if you just like the idea of

getting a package in the mail every month—Dynamic Graphics has a plan for you. For the past two years the company has been offering a monthly clip-art service called Designer's Club. In the \$49.50 monthly package, you get a copy of *Desk-*

Top Art that contains more than 40 EPS images and four to six TIFF images grouped around two themes; a manual; a pictorial index; and a supplement containing suggestions on what to do with these images. Back catalogs of themed image libraries are available at \$49.50 each for subscribers or \$74.95 for nonsubscribers.

A WORLD OF CLIP ART

by Gayle Ehrenman

If the only maps you own are the ones you pull from the glove compartment when you're lost, it's time to consider adding some to your clip-art collection. Most clip-art libraries include a map or two. These are fine for decoration, but if you want to show sales territories, distribution networks or office locations in detail, you'll need a more comprehensive selection.

Fortunately, a number of vendors sell libraries made up solely of maps. These range from the generic to the ultraspecific. U.S. state maps are easy to come by, and two of four packages we reviewed also offer international maps. But counties, highways, ZIP codes, and other more detailed regions that you might need are less common.

While there's much to be said for having the world at your disposal, it's not much of a world if you can't change it. All these maps come in editable vector formats, so once you

pull them into your graphics package you can recolor and resize the regions to your heart's content. But not all of them are grouped in the same way, and most come in only a single format.

COMPREHENSIVE APPROACH

The winner for the widest array of maps is *Lotus Freelance Maps*. This \$395 package includes a large selection of U.S. maps, which show an unusual amount of information—not just counties, but cities, area codes, ZIP codes, major highways, and three kinds of statistical areas (Metropolitan Statistical Areas, Nielsen's Designated Market Area, and Arbitron's Areas of Dominant Influence). The international series includes three perspectives of world maps, as well as continents and countries with boundaries and highly detailed maps of Canada.

All the maps are highly detailed, and since they work as a series of overlays, you can have as much detail

on a single map as you desire. Maps of the same area are not always drawn at the same size, though; for example, the national area code map is not the same size as the national state outline map, making it difficult to overlay one with the other. You can arrange items in regional groups or combine them with data-driven or text charts. The maps come in black and white, so you must recolor the regions to suit yourself.

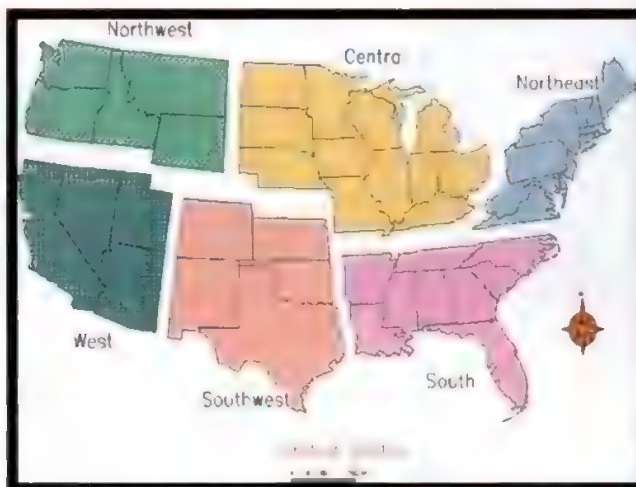
The main drawback to this otherwise fine package is that it comes only in *Freelance Plus's* native .DRW format, which isn't widely supported. If you have *Freelance Plus*, though, you can take advantage of its export capabilities to get the maps into something more widely useful.

GEOGRAPHIC LAYERS

MicroGrafx U.S. Maps Special Edition (\$149.95) takes a similar layered approach to map organization. These maps, which are provided in Micro-



MapArt (left) uses a hierarchical system of grouping objects. This makes it easy to recolor all or part of a map but makes resizing or changing labels more difficult. By contrast,



Micrografx U.S. Maps Special Edition Clip Art (right) places labels on a separate layer from the map, so you can choose the level of detail that's right for you.

The first question to ask yourself is "Do I want to commit to a monthly subscription service?" Unlike a book or record club, you're pretty much stuck with the selection of the month; you don't have the option of refusing a shipment. If you're doing a business presentation and need an illustration of a modem or a phone and all

you've received for the first three months are sports, food, and border graphics, you've wasted money on images you can't use.

This is not to imply that there are no business-related images. The "Commerce

3" volume contains some very useful and attractive images ranging from simple line-art illustrations of secretaries at their terminals to symbol-like graphics of airplanes and briefcases. Unfortunately, it's hard to track down enough business images to make you feel like you're getting your money's worth.

grafx's proprietary .DRW format for use with its *Designer*, *Charisma*, and *DrawPlus* graphics packages, arrange the various elements in layers, all of which are visible when you open a file. For example, when you first open the map of the United States, you see the overall border, state divisions, state and city names, the map key, and all bodies of water, each of which constitutes a layer. You then use *Designer's* layer manager to select only the elements that you want to display on-screen.

This package includes a map of the continental U.S. plus Alaska, Hawaii, and Puerto Rico in insets (none of the other packages consider Puerto Rico part of the United States); state maps with cities and counties; region maps; and an outline map with a superimposed American flag. The maps are attractive and easy to manipulate, though some states (for example, New Hampshire and Vermont) share one map. You can remove the unwanted state from your map, but you'll have to select each of its various layers to do so.

Micrografx's map collection falls down in the documentation department as well. You must discover what maps are included by looking at them one by one. There's no paper catalog of the maps, only a utility called Portfolio that lets you copy or save maps to the Windows clipboard or print unedited maps.

A DIFFERENT PERSPECTIVE

You won't have that problem with Kinetic's *U.S. Maps-3D* (\$195). This package includes 50 individual state maps and 44 images of the United States in CGM format, drawn with an interesting three-dimensional effect. They come in a variety of perspectives, tilts, and rotations; you could

even display them in sequence to create a limited slide animation of the map turning. The downside is that they're intended for use as images; they lack even labels.

As you'd expect, these maps are designed for use with *Kinetic Words, Graphs & Art*, a fact made clear through the extensive tutorial. A well-kept secret, revealed on the last page of the manual, is that you can import the maps into *Freelance Plus* as well. If you do so, however, you lose some of the capabilities available under *Kinetic Words, Graphs & Art*, such as the ability to alter the shapes of the states. It's also a bit difficult to see what's selected under *Freelance*, complicating the recoloring process.

Ostensibly, the individual 3-D state maps snap together like puzzle pieces to form regions. In practice this proved more thud than snap. The pieces never seemed to fit without overlapping or leaving gaps and protruding bits of drop shadow.

THE WORLD AT YOUR FINGERTIPS

MicroMaps' *MapArt* (\$179) puts its emphasis on the world. It includes two projections of world maps, plus regional maps and detailed country maps, all drawn in editable EPS format that can be used with almost any drawing or desktop publishing package. There are also bitmapped versions of the maps in .PCX format.

The maps are beautiful, and easy to work with since each type of object within a map (country borders, state borders, country names, and so forth) is organized as a group. The downside is that the maps are very complex and detailed, and you could wait an eternity for files to be read into your drawing package. You can spend the waiting time reading the documentation, which fortunately is very thor-

ough and makes it easy to find what you need.

Once you've finished importing, you'll need to start ungrouping the objects. This can be a time-consuming task since the objects are arranged hierarchically. For example, to delete city names from the map of Australia, you'll first have to ungroup the country from the initial groups—country borders and name—into the additional groups of territory borders and names, then ungroup the territories to get to the city location points and names. You can then either delete all the city names as a group or break down this group even further to delete only a particular city. ■

Freelance Maps, Version 3.0

Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 800-345-1043.

List Price: \$395.

Formats: *Freelance* (.DRW)

CIRCLE 421 ON READER SERVICE CARD

MapArt

MicroMaps Software, P.O. Box 757, Lambertville, NJ 08530; 609-397-1611.

List Price: \$179 (U.S. states by county only, \$49).

Formats: EPS, .PCX

CIRCLE 422 ON READER SERVICE CARD

Micrografx U.S. Maps Special Edition Clip Art, Windows Version

Micrografx Inc., 1301 Arapaho, Richardson, TX 75081-2444; 800-272-3729, 214-234-1769.

List Price: \$149.95.

Formats: Micrografx (.DRW)

CIRCLE 423 ON READER SERVICE CARD

U.S. Maps-3D

Kinetic Presentations Corp., 240 Distillery Commons, Louisville, KY 40206-1990; 502-583-1679.

List Price: \$195.

Formats: CGM

CIRCLE 424 ON READER SERVICE CARD

Computers, FCC Class A, Class B, and You — or When is it better to get a B than an A?

You need to know the difference between computers that meet the FCC class B radio frequency emissions standards and those that meet only the Class A standards.

Computers emit radio signals in their operation. Because these signals may cause interference to radio and television reception, the marketing and the use of computers is regulated by the Federal Communications Commission. Under federal rules, computer users are responsible for remedying interference, including interference in neighboring homes.

Computers certified by the FCC as meeting the Class B standard are less likely to cause interference to radio and TV reception than those that have been verified by the manufacturer or importer to the Class A standards. Only Class B certified computers may be advertised, sold, or leased for use in residences. A similar regulatory program applies in Canada.

Buyers seeking computers for use in homes (including offices at home) should shop for computers and peripherals which have been Class B certified. These devices carry a label with an FCC ID number. Both new and used Class A verified devices may be sold only for use in commercial and industrial locations. Signals from computers are more likely to be masked by electrical noise from other equipment in such an environment. These areas are also likely to have fewer radios and TVs. Accordingly, equipment marketed only for use in these locations may meet the less rigorous Class A standard. Class B certified equipment may be marketed for use in residences as well as commercial and industrial locations.

As you shop for a computer for use in your home, look for the FCC classification in the specifications or ask your vendor to recommend only machines that have been certified to the Class B limits. TV viewers and radio listeners in your home and in neighboring homes will be glad you did.

GRAPHICS VECTOR CLIP ART



There may not be many business images in the *DeskTop Art* collection, but the ones that are there are quite impressive. Unfortunately, these spectacular-looking images are almost impossible to edit.

The organization of the files is another problem. Even though the collections are presented in themes, there's no attempt to categorize the images within each theme. The only organization is an alphabetical listing of images within the monthly pictorial index. This might be remedied by Dynamic Graphics' *imageQUEST* electronic indexing system (not available for review), which will let you track down and preview thumbnails of images by category and description. For now, you'll have to settle for a visual search through the pictorial index.

WHAT YOU GET IS WHAT YOU GET

Since Dynamic Graphics has been selling clip art since 1964, you'd expect the *DeskTop Art* images to be well-seasoned and slick—and you won't be disappointed by these strong, heavily stylized graph-

ics. These images are a great example of how far simple, high-quality line art can go, but they're not as customizable as most electronic clip art.

DeskTop Art's images (all in the form of black-and-white line art), though spectacular, are almost impossible to edit. The objects and shapes, which seem to be the result of autotracing, are hard to work with. An image of a man talking on a telephone, for instance, consists of 77 separate objects. Light-colored objects, such as the highlights on the phone chord, are represented by white opaque shapes, while the more general objects, like the phone and face, are black opaque shapes. These objects are not logically separated, so it is difficult, though not impossible, to color them.

DeskTop Art is very stylish and has an impressive back catalog. If you're looking for clip art pertaining to a specific subject matter, you'd do well to explore it. With almost 50 images being introduced each month, you'll probably find something you can use that looks distinctive and professional. But don't count on editing or recoloring them.



FACT FILE

DeskTop Art
Dynamic Graphics,
6000 N. Forest
Park Dr., Peoria, IL
61614; 309-688-
8800.

Formats: EPS

List Price: Designer's Club membership, \$49.50 per month; for nonsubscribers, \$74.95 per volume. Commerce 3 (42 images); Seasonal 3 (38 images); Attention Getters 1 (40 images); Athletics 2 (40 images); Borders and Designs (56 images); Sales and Leisure (51 images); Spring and Lifestyles (56 images).

In Short: If you like receiving a monthly surprise package, you'll love this clip-art-of-the-month service. The images in these volumes (which are also available individually) are spectacular, but almost impossible to edit.

CIRCLE 549 ON READER SERVICE CARD



IMAGE CLUB GRAPHICS Digit-Art

by David Foster

Formed at the beginning of the desktop publishing explosion in the mid-1980s, Image Club Graphics has striven to be an important resource in the DTP design environment. With *Digit-Art*, it succeeds. This comprehensive, almost exhaustive collection of clip-art images, backgrounds, borders, and display type is divided among

Make a big change for small change.

If you're changing to Windows,[™] why not take a bigger step? Up to a new concept in Windows word processing. Professional Write[®] PLUS from Software Publishing Corporation.

Professional Write PLUS is the new Windows word processor specially designed for business professionals. The one that easily handles imported text and graphics from many sources. Updates figures automatically using DDE—even within text. And offers editable

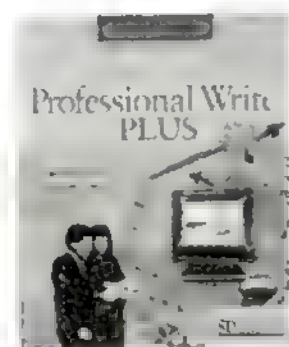
Trade up to a
new concept in Windows
word processing.

\$99

WYSIWYG page views. It also comes with an E-mail front end, as well as an integrated grammar checker that can add power to your prose.

And until June 30, 1991, you can trade up for just \$99* if you own a qualifying word processor.

SPC SOFTWARE
PUBLISHING
C O R P O R A T I O N



Discover Professional Write PLUS. Call 1-800-336-8360, Operator 502, for a participating dealer.

*To be eligible for the \$99 offer, you must provide proof of ownership of qualifying word processor. Special discounts for OfficeWriter and Professional Write owners. You may also obtain information to order directly by mail. Professional Write PLUS list price: \$249.00. Runs on Windows 3.0. Professional Write is a registered trademark of Software Publishing Corporation. Windows is a trademark of Microsoft Corporation. © 1991 Software Publishing Corporation, 1901 Landings Dr., Mountain View, CA 94039-7210.

GRAPHICS VECTOR CLIP ART

20 volumes that are available separately for \$99 or as a package for \$799 on multiple floppy disks or on one *ArtRoom* CD-ROM disk. In all, there are more than 3,000 black-and-white and about 100 color EPS files.

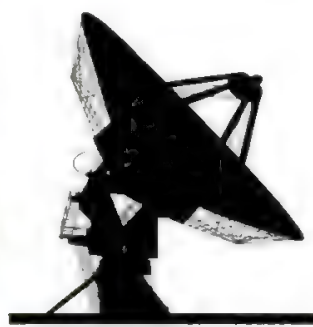
The volumes are fairly well organized. Each EPS file is categorized and named logically in an easy-to-follow directory that features printed images of all the files. Though 3,000 images may seem like an overwhelming number, they are categorized in a way that makes it easy to find the image you need.

The first few volumes of the library are a miscellaneous collection of images organized by subcategories that include everything from light bulbs to border tape. Subsequent volumes are dedicated to a particular focus, such as the universal symbols volume that includes road signs and other useful reference graphics. Other volumes include people, business and industry, world maps, design elements, design letters, food and entertainment, occasions, life-

style, office environment, and education and design backgrounds. There's an entire volume of very good celebrity caricatures, including the Ayatollah Kho-



The detailed images in *Digit-Art's* extensive library may be difficult to edit—for instance, the lattice work of the satellite dish consists of many individual line segments.



meini, Madonna, Mike Tyson, and Mother Theresa. There are also plenty of straightforward, well-rendered images of business scenes and business icons, such as a man with a laptop, a group of business people in a planning meeting, and a 3-D icon of a dollar sign.

VARIETY OF STYLES

The images are depicted in a variety of styles and levels of complexity, which adds to their usefulness. Images range from a detailed and modeled drawing of an arm being flexed to a symbol of a fork.

There is also a very effective use of tone and gradation in many images, as well as detailed linear drawing and many cartoon-style illustrations that bring a light-hearted feel to some of the images.

The more detailed images tend to be difficult to edit simply because they contain many objects. For instance, an ungrouped silhouette of a satellite dish consists of 88 objects, most of which are separate line segments used to represent the complicated lattice work supporting the dish. In

addition, not all images can be edited as extensively as you'd like. For example, you can add color to the hands and face of the image of a man with a laptop, but not to his hair or suit and tie, which are all one piece and can't be colored separately.

In the near future, Image Club plans to

CAPTURING THE SPECTRUM OF TRUE GRAY-SCALE!



Genius proudly introduces its **GeniScan GS-B105G 256 True Gray-Scale Hand Scanner**. The GS-B105G scans images in 256 shades of gray at 100-400 DPI. With the scanner's powerful software packages: **Color Maestro** (gray-scale version) and **iPhoto**, image enhancement software, you have the creative ability to completely edit and enhance images. By capturing the ideas of your imagination, the GS-B105G is your solution to the world of desktop publishing, presentations, and multi-media.

As an added bonus, you also receive **CAT Reader Optical Character Recognition** software that allows you to directly scan in text and convert to a text file. What more could you ask for in a package? It's Genius...Simply Genius! **Call today at 800-456-7593 for more information.**

*** For Color and Gray-Scale Scanning, Genius offers the **GeniScan GS-C105 Plus Color Hand Scanner** package which includes **Color Maestro** (color version), **iPhoto**, and **CAT Reader OCR**.

Genius
SIMPLY GENIUS!

KYE INTERNATIONAL CORP.

2605 E. Cedar St. Ontario, Ca 91761
Sales: (800)456-7593 Main: (714)590-3940
Technical Support: (714)590-8882



Introducing the Kodak Ektaprinter 7008 printer. The 8PPM laser printer that comes fully equipped, even for complex graphics—no upgrades or add-ons needed!

Upgrading some laser printers to handle all your applications can be a little like putting a puzzle together. But with the new 8 PPM Kodak Ektaprinter 7008 printer, everything is standard. That includes 1.5 MB of RAM, and both PCL and HPGL emulations. Result: no upgrades needed. And you get full 300 dpi resolution in both text and graphics. A 12 Mhz 68000 microprocessor is also standard equipment, and that means faster first prints.

See this latest member of the "Printer with a Plus" family. For the name of a dealer near you, call 1 800 344-0006, Ext. 409.

NO MISSING PIECES. KODAK

Kodak Ektaprinter 7008 printer



GRAPHICS VECTOR CLIP ART

PC
MAGAZINE

FACT FILE

Digit-Art

Image Club
Graphics, 1902
Eleventh St. SE, #5,
Calgary,
Alberta T2G 3G2
Canada; 800-661-
9410, 403-262-8008.

Formats: EPS

List Price: \$99 per volume (80 to 460 images each); CD-ROM with all 22 volumes (over 3,000 images), \$799. Volumes 1-3 (Miscellaneous); Volumes 4-5 (People); Volume 6 (Business and Industry); Volume 7 (World Maps); Volume 8 (Miscellaneous); Volume 9 (Design Elements); Volumes 10-12 (Design Letters and Symbols); Volume 13 (Food and Entertainment); Volume 14 (Occasions); Volume 15 (Lifestyle); Volume 16 (Office and Education); Volume 17 (Universal Symbols); Volume 18 (Celebrity Caricatures); Volume 19 (Silhouettes); Volume 20 (Design Backgrounds).

In Short: If you can't find the image you want among the 3,000 in this collection, you haven't really looked. Every type of image you can imagine is here, in a variety of styles and levels of complexity.

CIRCLE 589 ON READER SERVICE CARD



GEM images, which were originally developed for the Atari ST, takes an interesting view of clip art.

DrawArt is a small, rather eclectic collection of object-oriented images, some of which are brilliantly executed. Besides the usual front and three-quarters angle views that you're used to, you'll find an underside view of a pickup truck, a rear view and an aerial perspective top view of a computer, a distorted perspective of a telephone and an angled bottom view of a jet taking off, to name just a few of the curiosities.

From a business presentation standpoint, however, the package gets low grades. There is a selection of arrows, but many of the traditional business images like bullets, flags, business people, and currency symbols are in short supply. Many of the images, moreover, are duplications with only minor alterations (such as color), or composites made up of several other images. Since the library is modest in size, it would do better to have a larger variety of images.

HEAVY ON THE DETAILS

The majority of the drawings are exemplary and have great amounts of detail. Unfortunately, such detailing makes for large files that take a long time to load, import, or export. The structure of an object itself is questionable at times. In the bottom view of the jet, for example, four line segments are used to create rectangles that could have been stored more simply and economically as polygons. These unusual constructions make coloring and editing the objects difficult. One nice touch is that since you can make some of the images opaque or transparent, you can use

a color background without having it bleed through the image.

Migraph's disk indexing system is fairly comprehensive and coordinates well with the pictorial catalog included with the software. However, the library's disks could be labeled more specifically than "A" and "B."

Although the art in *DrawArt Professional* is exceptional, poor object design limits its usefulness.

APPLIED MICROSYSTEMS ImageFile

by Kellyn S. Betts

ImageFile hasn't been upgraded in three years and should probably feel out of date. But while its orientation is in dire need of refurbishment, its images have the strength of character to seem fresh.

ImageFile is presently available only as a set of .DRW files aimed at *Freelance Plus* users. The software comes in two versions: \$395 for a set of gray-scale images and \$495 for a set of both the gray-scale images and color duplicates optimized for *VideoShow*, which isn't a piece of hardware you hear much about these days. The set of 305 images is in the process of being converted to both CGM and EPS formats. Ninety percent of the current collection was created by one artist, but the company is actively soliciting new artwork. Hopefully, the new images will be as good as the existing ones.

This artwork can make the most mundane object or piece of equipment seem more interesting. Almost all objects are presented strikingly, either by unusual physical placement and lighting or by being teamed with a well-placed prop.

release two more volumes of clip art. Volume 21 will contain "fabulous '50s" images, and Volume 22, a library of business cartoons. If you can't find the image you need somewhere in the extensive *Digit-Art* libraries, chances are good that you didn't really look.

MIGRAPH INC.

DrawArt Professional

by Michael Graham

Are you the type of person who sees things from a different angle or with a slight twist? If so, *DrawArt Professional* (\$69.95) has your name on it. This set of

PC
MAGAZINE

FACT FILE

DrawArt

Professional

Migraph Inc., 200 S. 333rd St., Federal Way,
WA 98003; 800-223-3729, 206-838-4677.

Formats: GEM

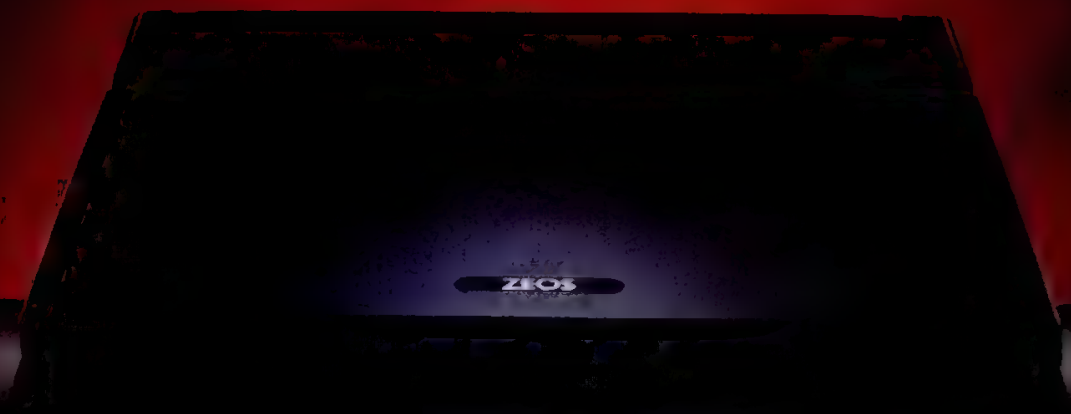
List Price: \$69.95 (178 images).

In Short: Expect the unusual from this eclectic collection of GEM images. What these images lack in editability they make up for in artistic style and unique perspective.



You won't find many different types of images in the small, eclectic *DrawArt Professional* library, but you will find highly detailed images depicted from some interesting perspectives.

CIRCLE 601 ON READER SERVICE CARD



ZEOS®
Simply the best
notebook you
can buy.

Take it from the experts:



A few expert opinions:

"There's a new king of the hill—the ZEOS Notebook..." — **PC Magazine** ■

"This notebook is a

steal." — **InfoWorld** ■ *"In this category I'm most*

impressed with the ZEOS Notebook...it has to be

the number one contender." — **John C. Dvorak**

■ *"The best price performer in its category."*

— **Mobile Office** ■ *"An outstanding value."*

— **PC Week** ■ *"Impressive"* — **PC Sources**

Impressive Indeed!

And The Price?

t and ded.

our light weight snap-in, snap-out battery packs. They're so light and easy to use, you can easily take an extra one with you on those really long trips. You can get even more life out of a single charge by using our programmable power management system. Hour upon hour of Notebook computing power!

CONNECTIVITY TOOL!

Your new ZEOS notebook is a great connectivity tool. Utilizing our optional built-in 2400 baud MNP Class 5 modem, connectivity buffs will find themselves

logging on at every turn. And speaking of connectivity, we've kept the I/O easy to use too. Because unlike many of the others, your new ZEOS notebook has the same industry standard port connectors you'll find on your larger desktop system. Completely compatible! Serial and Parallel ports; even an external VGA connector. All industry standard and ready to go the minute you receive your system.

It's attention to detail that makes the difference. Tens of thousands of hours of development time have been invested. We've been thinking and re-thinking exactly what you want in a notebook, and now we're building it for you. We think you'll agree, it's an incredible product. Plus, your new notebook is backed by the best support in the industry, 24 Hours a Day.

\$1995!

ZEOS 24 HOUR A DAY SUPPORT

After all, it was ZEOS that invented 24 Hour a Day Toll Free Sales and Technical Support. We're always here to help. Any time you need us your telephone is a Toll Free Hotline—direct to your own personal Technician. 24 Hours a Day, 365 Days a Year. Now that's ZEOS value. But we don't stop there either.

Your new notebook is also backed by our 30 Day Absolute Satisfaction Money Back Guarantee and One Full Year Limited Warranty. You're going to be very satisfied. We don't just say it. *We Guarantee It.*

ORDER YOUR OWN ZEOS NOTEBOOK NOW!

You can order your new ZEOS notebook *right now*. Simply pick up the phone and give us a call now at 800-423-5891. At last, a full featured notebook that lets you compute anywhere. You're going to love it. That's a guarantee!

**ORDER NOW TOLL FREE:
800-423-5891**

**NOW. YOUR COMPLETE
'286 NOTEBOOK! VGA,
20MB HARD DRIVE, 1.44MB
FLOPPY AND MORE. LIGHT
AND LOADED! INCREDIBLE.**

**ONLY \$1995
386SX ONLY \$2295!**

- '286-12 or '386SX-16 CPU.
- 1MB DRAM, expandable to 3 or 5MB.
- 20MB High Speed HDD.
- Built in High Density 3.5" 1.44MB floppy drive.
- High Resolution VGA display. Fluorescent backlight 640x480, 32 grey scales. Bright and clear!
- Removable quick charge NiCad battery. Two hour plus battery life typical, more using Programmable Power Management!
- Quick charge or trickle charge using included AC power adapter.
- Extra battery packs and external charging stand available.
- 82 key keyboard. True 101 key emulation.
- Industry standard Serial and Parallel Ports.
- VGA port for external VGA color display. Great for demos!
- Total system weight under seven pounds with battery!
- 30 Day Absolute Satisfaction Money Back Guarantee and ZEOS Customer Satisfaction Package.
- One Full Year Limited Warranty.
- 24 Hour a Day Toll Free Technical Support, 365 Days a Year.

**ORDER NOW TOLL FREE:
800-423-5891**

FAX Orders: 612-633-1325
Minnesota: 612-633-4591
Hearing Impaired (TDD)
Orders: 800-228-5389
Outside US and Canada:
612-633-6131
MasterCard, VISA, Discover,
Am Exp, Z-CARD.
Open 24 Hours a Day,
365 Days a year!



**take desktop
over anywhere!
ZEOS Notebook.**



The ZEOS Guide to the Perfect Notebook:

 **PROCESSOR:** PC Magazine recommends a '286 or '386SX processor pointing out that "8086- and 8088-based portables have only half to a third of the computing power of a 286." That's why ZEOS offers you your choice, '286 or 386SX! More power for you. After all it's just like a 6.5 pound desktop!

 **DRIVES:** Two drives, built in! A whisper quiet high speed 20 Megabyte hard disk *plus* a 1.44 Megabyte 3.5 inch floppy. Remember, with a built in floppy drive you don't need to fool around with strange interfaces to load and transfer files.

 **VIDEO:** ZEOS raises the ante to VGA! We're talking about bright and crisp VGA displayed on one of the largest notebook screens in the industry. The display also features advanced fluorescent backlighting, 32 grey scales and 640 x 480 resolution. Plus, it can be adjusted to any position over a 135° angle and features easily adjustable brightness and contrast controls. Easy viewing under virtually any lighting conditions. You can connect to an external VGA color monitor too!

 **GREAT BATTERY FEATURES:** Every battery feature you want. You can plug your notebook in and "quick charge" the battery in less than one hour or you can "trickle charge" while in use. Plus, your battery easily snaps out allowing the quick installation of an optional replacement battery. It's great to be able to carry a light weight spare for those especially long trips. An optional battery charger stand is available as well.

 **INTELLIGENT POWER MANAGEMENT:** Your new ZEOS notebook features an intelligent programmable power management system if you wish to use it. Based on the length of time since your last keystroke, you may reduce CPU speed, display screen backlighting etc. Full power is immediately restored at the stroke of any key. The system even knows *not* to use the power management system when you are operating on AC power!

 **SYSTEMS STATUS AT A GLANCE:** Yes, monitor eight key system components at a glance! We've equipped your new notebook with eight LED indicators which monitor disk access, keyboard functions and power status. There is even an audible alarm

which may be programmed to inform you of a low battery condition and to let you know if the cover is closed with the power on. Now that's one smart notebook!

 **DESKTOP KEYBOARD FEATURES:** We're talking 82 full size keys with full 101-key emulation. And the keyboard isn't squeezed either. The distance between the "Q" key and the "[" (left bracket) key measures 7.5 inches, just as PC Magazine suggests. The keys are of standard size, plus touch typists will love our full 3.5mm keystroke. Type for hours and love it!

 **CONNECTIVITY AND I/O:** Keeping in touch is easy when you order our internal 2400 baud MNP Class 5 modem. Simply plug in the phone line and dial away. How about I/O ports? Many notebooks don't have them and if they do they're often non-standard. But your ZEOS notebook has *industry standard* I/O—serial, parallel and VGA. Just like your desktop!

 **FCC & UL APPROVALS:** Your new ZEOS notebook features both FCC Class B and UL approvals. We've also met CSA and VDE requirements too, just for good measure. Quality and reliability.

 **WATCH THE DETAILS TOO:** Like memory expandability. One Meg comes standard, you can also order a total of 3 or 5MB as a factory option. And lots of other details. Like a recessed power-on reset button, a soft carrying handle, built in speaker and more. You're going to love it! And there's no reason to wait.

CALL NOW TOLL-FREE:
800-423-5891

CHECK IT OUT!

Now, you can take desktop computing power anywhere! Your ZEOS notebook has many features of obvious importance. Also, there are a number of features that are subtle yet critical to your ultimate satisfaction. We'll go over them here one by one. We think you'll agree your new ZEOS Notebook is the one for you!

Your New ZEOS Notebook.
Take your pick!

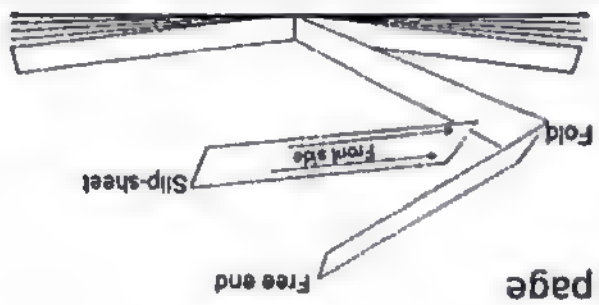
As a '286
Only \$1995!

As a '386SX
Only \$2295!

'286 or '386SX, Hard Drive, Floppy Drive,
VGA, Under 7 lbs., Beautiful!

Unbelievable.
Believe It!

Call Now!
800-423-5891



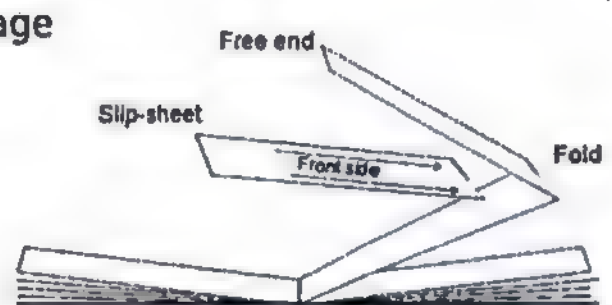
1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet



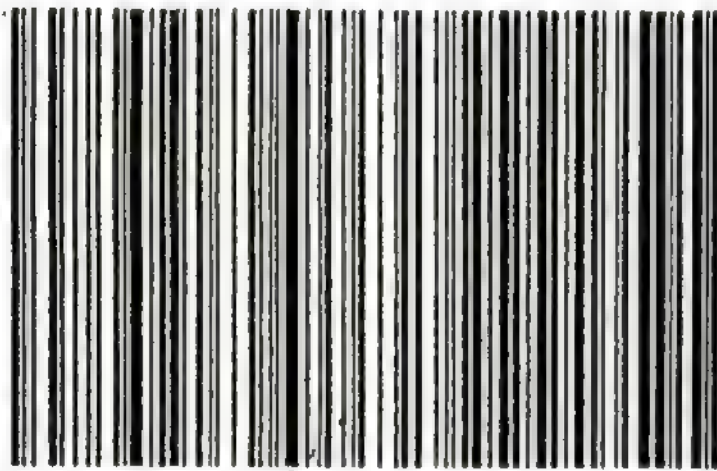
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-001B

Back

1. Follow instructions on the other side

"THERE'S A NEW KING OF THE HILL"**—PC MAGAZINE**

"King of the Hill... Impressive... The best price-performer... An outstanding value... A steal... The number one contender..." We couldn't have said it better ourselves. The experts love the new ZEOS Notebook. And you will too. At only \$1995 for our '286 version and \$2295 for our new 386SX, you simply can't find a better notebook anywhere!

As PC Magazine said, the ZEOS Notebook "offers a top notch combination of power, weight, features and price..." And you can pick your power! Choose our '286 version or go for the incredible new ZEOS '386SX. Combine either with our high speed hard disk, built in 1.44MB floppy drive, VGA and more—you've got the greatest notebook going at any price!

INCREDIBLE DESKTOP FEATURES IN A NOTEBOOK.

In fact, it's really like owning a 6.5 pound desktop that you can take with you anywhere! Look closely at the details. Like our crisp 10" VGA display. The ultimate in sparkling clarity, it features advanced fluorescent backlighting for vivid VGA graphics. Then, the drives.

Two drives are better than one! First, your notebook will include our whisper quiet high speed, high capacity hard disk. It will read and write your data so fast chances are you'll hardly know it's there. Then we're building in an industry standard 1.44 Megabyte 3.5 inch floppy as well.

While most notebooks don't include a floppy drive at all, you're really going to appreciate your ZEOS notebook's industry standard 3.5" floppy. It makes loading software and transferring files a breeze. Simply toss in your 1.44 and it's done. Anyway, can you imagine a desktop system without a floppy? We couldn't either. That's why your ZEOS notebook has one. It's great!

But the features of your incredible new ZEOS Notebook don't just stop there. Detail after detail we're giving you more than anyone else. Much more, for much less. Take a closer look.

DETAILS MAKE THE DIFFERENCE!

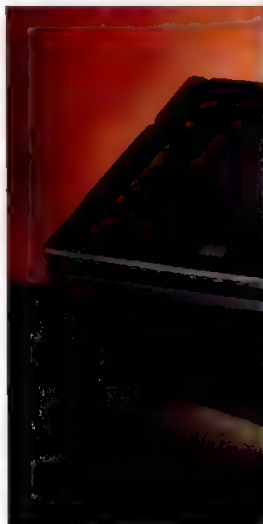
For instance, the battery system of your new notebook is the most advanced on the market. You can quick charge, or trickle charge, any time your system is plugged in. You can also take the battery out and use the optional charging stand if you wish.

Either way, you're sure to appreciate

Light Load

From

**Now, you can
computing power
The incredible Z**



10 Good Reasons To Buy From ZEOS®

Reason #1

"Overall Excellence."

As *PC Magazine* said "Price is always a consideration. So are benchmark test results. But both factors can be deceiving, which is why we consider them in the context of other aspects that will make the difference months and years down the road."

These are the attributes which *PC Magazine* used in awarding ZEOS the coveted Editor's Choice, not once but seven times. And "Overall Excellence" are the very words *PC Magazine* used in describing ZEOS systems comparing them to all others.

Reason #2

Dazzling Performance.

In one recent '386 review, *PC Magazine* awarded ZEOS Editor's Choice. "The ZEOS '386 blows away every other computer... a smart choice" is what they said. And in another recent review, *Government Computer News* said the ZEOS 33MHz '386 is "arguably the fastest MS-DOS and OS/2 micro in the world."

Dazzling Performance is built into every ZEOS system. It's a key component of ZEOS Overall Excellence.

Reason #3

Exceptional Quality.

PC Resource Magazine put it this way, "ZEOS... provides quality comparable with IBM or Compaq and does so for about 70% of the price." ZEOS uses only the very best components. And every system is fully tested and burned-in right in our own labs.

Reason #4

Value.

InfoWorld says, "We find the ZEOS '386 an excellent value. Speed: Excellent. Compatibility: Excellent."



Value: Excellent."

Personal Computing said, "ZEOS... is the best value we've come across... its performance is right up there with the slickest, most expensive PCs you can buy."

Reason #5

Warranties and Guarantees.

ZEOS believes in its products. That's why we offer each and every customer our 30 Day Absolute Satisfaction Money Back Guarantee, no questions asked. Plus, our One Full Year Limited Warranty and Express Parts Replacement Policy. Optional On Site Service is available too. Call for details.

Reason #6

24 Hour Toll Free Technical and Sales Support.

At ZEOS, the customer is #1. That's why we invented 24 Hour a Day Tech Support. For *your* convenience. If you buy a product from us we feel we should be there to help, any time of the day or night. Give us a call Toll Free! 800-423-5891. Anytime!

Reason #7

Experience.

Almost unique in the mail order computer industry, ZEOS maintains its own chip level Research and Development staff. In addition to Systems Manufacturing, we also operate our own Board Level Manufacturing facility.

ZEOS has been involved in Research and Development since our incorporation back in 1981. Our strong and experienced Research, Manufacturing and Technical Staff translates into superior factory direct computer systems for you.

Reason #8

A Sterling Reputation.

In magazine after magazine and review after review ZEOS systems are cited for Overall Excellence, for Excellent Value, as the Right Choice and so on. All of this is flattering but the most important thing is this: What do our customers think? Frankly, they love us. The systems and the support. That means more to us than anything.

Reason #9

Easy to Buy.

ZEOS systems are easy to buy. You can pick up the phone any time of the day or night and order your new ZEOS computer. And we accept MasterCard, Visa, Discover, American Express, and Corporate Purchase Orders from Fortune 1000 Companies, Colleges, Universities and Governments. Complete Leasing Programs are available as well.

And now the Z-CARD! It's your very own ZEOS Credit Card and you can apply today. With the Z-CARD you can charge your ZEOS purchases and pay in easy monthly installments. It's just like a Bank Card. Why not apply for your Z-CARD now!

Reason #10

You're Going to be Very Satisfied.

When it comes right down to it, you're going to be very satisfied with your new ZEOS system. Our goal is your complete satisfaction. And that's our commitment to you. To quality. To performance. To reliability and support. To *Value*. We don't just say it, *we Guarantee it!*

FAX Orders Dial: 612-633-1325
In Minnesota Call: 612-633-4591
MasterCard, VISA,
Discover, AmEx,
Z-Card and C.O.D.
Open 24 Hours a
day, 365 Days
a year.

Order Now
Toll Free

800-423-5891



Apply Now for the Z•CARD!

NO ANNUAL
FEE!

SEND FOR YOUR ZEOS CREDIT CARD



- Low Consumer Rate!
- No Annual Fee!

Now you can send for your own ZEOS Credit Card. It works just like a MasterCard or Visa for ZEOS purchases.

Fill out your Z•Card™ Application and mail it today to ZEOS International, Z•Card

Processing Center, 530 5th Avenue

N.W., St. Paul, MN 55112. We'll give you a call

as soon as your credit line is established!*

Please complete all appropriate sections, *providing at least two years residence and employment history*. **THIS IS NOT A CREDIT AGREEMENT!** One will be sent to you upon authorization of an account. (This Form Must Be Signed To Process Your Order.) All Financed Purchases Are Subject To Credit Approval. **If You Have Any Credit Questions, Please Call 800-421-8942 For Assistance. Thank You!**

A married person may apply for individual credit. I am applying for (please check appropriate box):

- ☐ **JOINT CREDIT** with another person. Complete entire application.
- ☐ **INDIVIDUAL CREDIT** but rely on income or assets of another person as a basis for repaying the credit requested. Complete entire application.
- ☐ **INDIVIDUAL CREDIT.** Do not complete Section C.**

**If you are a married Wisconsin applicant, you must provide your spouse's information as indicated, even though your spouse may not be signing the contract.

NOTICE TO WISCONSIN APPLICANTS: YOU MUST DISCLOSE YOUR MARITAL STATUS:

☐ married ☐ unmarried ☐ legally separated

A. YOUR PERSONAL INFORMATION

Name _____

Home Phone (_____) _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Since? (Mo./Yr.) _____ ☐ Buy ☐ Rent ☐ Other _____

Previous Address _____

City _____ State _____ Zip _____

Employer _____ Since? (Mo./Yr.) _____

Monthly Gross Salary \$ _____ Daytime Bus. Phone (_____) _____

Previous Employer _____ From - To _____

Occupation _____

Income from alimony, child support or separate maintenance payments need not be disclosed if you do not wish to have it considered as basis for repaying this obligation.

Additional Monthly Income \$ _____ Source: _____

Name & Address of Nearest Relative Not Living With You _____

Relationship _____

B. CREDIT INFORMATION

PLEASE TELL US IF YOU HAVE: Checking Account ☐ Yes ☐ No Savings Account ☐ Yes ☐ No

	Y/N	How Many?	Y/N	How Many?
Bank Loan	_____	_____	Dept. Store Charge Card	_____
VISA	_____	_____	Credit Union Account	_____
MasterCard	_____	_____	Other Major Charge Cards	_____
Finance Company Loan	_____	_____		

C. JOINT APPLICANT INFORMATION

Joint Applicant's Name _____

Soc. Sec. No. _____ Date of Birth ____/____/____

Address _____ Apt. _____

City _____ State _____ Zip _____

Home Phone (_____) _____ Date of Residence (Mo./Yr.) _____

Joint Applicant's Employer _____ Since? (Mo./Yr.) _____

Bus. Phone (_____) _____ Monthly Gross Salary \$ _____

CUSTOMER AUTHORIZATION

I authorize ZEOS International, Ltd. or its assignees to investigate credit records and to report my performance hereunder to credit agencies. I hereby certify that the following information is furnished to you for the purpose of obtaining credit and is true and correct to the best of my knowledge and belief.

Applicant's Signature _____

Date _____

Joint Applicant's Signature _____

Date _____

FOR MARRIED WISCONSIN APPLICANTS:

I acknowledge that the obligation described herein is being incurred in the interest of my marriage or family.

Buyer's Signature _____ Date _____

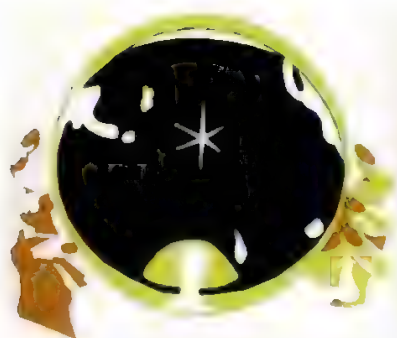
There are costs associated with the use of this credit card. To obtain more information about these costs, call us at 800-421-8942 or 612-635-0613 or write to ZEOS, Z•Card Processing Center, 530 5th Avenue N.W., St. Paul, MN 55112.

NY—A consumer credit report may be requested in connection with this application or in connection with updates, renewals or extensions of any credit granted as a result of this application. If I subsequently ask for this information, I will be informed whether or not such a report was requested and, if so, the name and address of the agency that furnished the report.

OH—THE OHIO LAWS AGAINST DISCRIMINATION REQUIRE THAT ALL CREDITORS MAKE CREDIT EQUALLY AVAILABLE TO ALL CREDITWORTHY CUSTOMERS AND THAT CREDIT REPORTING AGENCIES MAINTAIN SEPARATE CREDIT HISTORIES ON EACH INDIVIDUAL UPON REQUEST. THE OHIO CIVIL RIGHTS COMMISSION ADMINISTERS COMPLIANCE WITH THIS LAW.

*Financing not available in Alaska, Hawaii or outside the continental U.S.

GRAPHICS VECTOR CLIP ART



Even the most mundane images are rendered in an interesting fashion in the *ImageFile* library. Images like the axe-wielding man and the crystal ball cradled in a gypsy's hands are true show-stoppers.

Images like the executioner-style budget axe man and the crystal ball cradled in a gypsy's hands are downright memorable. All the information required to pick a logically named picture off a disk is supplied next to its representation in the manual.

CHARMING, BUT INCOMPLETE

Though charming, this collection is not comprehensive. *ImageFile* was designed as a higher-quality supplement to *Freelance Plus*'s own clip-art collection. As a result, it's quite eclectic. By design, these images are intended to appeal to people in government, medical fields, and education. The collection manages to cover most of the basic business bases and has some really impressive-looking computer images. It also has a reasonable collection of industrial, scientific, publishing, and technical symbols, as well as

some gorgeous backgrounds, but none of these categories has all the images you'd expect. Missing entirely from this set are little extras like maps, flags, and road signs.

The organization can be as imaginative as the images themselves—the man with the leaky umbrella is found under “finance,” for example—so retrieval can be a bit of a challenge. Dividing the relatively small number of images into 16 categories further complicates matters. These categories are stored as subdirectories on two different sets of disks in the \$495 set.

The images contain a large number of component curves but were created logically enough to make editing and recoloring easy. Each file is saved as one group of objects, however, so extensive editing will take some work. The manual has a number of hints on using *Freelance Plus*'s tools to manipulate the artwork and includes an inspiring set of sample uses for the images. In addition, the gray-scale coloring of the opaque images is done quite well and shows its worth in print output. The program's batch-file-based installation program is troublesome, but unless you're using *VideoShow* you won't need to bother with it.

At present *ImageFile*'s appeal is limited by its format and its less-than-comprehensive library of images. If you just need supplementary, run-of-the-mill images, look elsewhere. But if you're attracted to the unusual or are looking for one show-stopping image, this may be the package for you.

3G GRAPHICS INC.

Images With Impact!

by Luisa Simone

Images With Impact! is a good clip-art library that's getting better all the time. The three volumes currently available (Accents and Borders 1, \$129.95; Graphics and Symbols 1, \$99.95; Business 1, \$129.95) and the soon-to-be released People 1 (\$189.95) display a consistent philosophy: Clip-art images should be easy to use—and edit.

Since the objects come already filled with color—either gray or white—novice users don't have to worry about background rules showing through non-opaque drawings. Many pictures contain objects that are logically subgrouped within larger scenes; this lets you not only recolor a picture in minutes but also ungroup elements from the larger drawing to use on their own. For example, the auto mechanics icon appears to contain half a wrench—until you ungroup the object and find that a white rectangle has been hiding the other half.

Once you understand that each grouping of images in the manual corresponds to a subdirectory on the disk, you can copy a file to your hard disk in a jiffy. And the naming conventions are problematic only because they try to abbreviate sensible descriptions to DOS's eight-character limit, so “man on the run” becomes M_OnRun.eps.

HIGH POINTS FOR HIGH TECH

Business 1 gets high points for its computers and high tech images, including a



ImageFile

Applied Microsystems, 510 W. Tudor Rd., #3, Anchorage, AK 99503; 800-327-2588.

Formats: *Freelance* (.DRW)

List Price: Black and white only, \$395; *VideoShow* version, \$495.

In Short: For that single show-stopping image, turn to *ImageFile*. This collection is well-drawn and logically constructed, but it's limited in range, and currently it's only available in *Freelance* (.DRW) format.

CIRCLE 502 ON READER SERVICE CARD



Images With Impact!

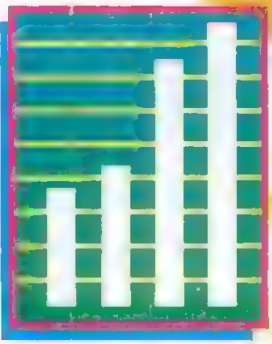
3G Graphics Inc., 11410 NE 124th, #6155, Kirkland, WA 98034; 800-456-0234, 206-367-9321.

Formats: EPS

List Price: Graphics and Symbols 1, \$99.95; Business 1, \$129.95; Accents and Borders 1, \$129.95; People 1, \$189.95.

In Short: The imaginative images in this collection are so logically constructed that even novices can edit them easily. However, the high tech images tend to be more elegant and sophisticated than the pictures of people.

CIRCLE 503 ON READER SERVICE CARD



**COLOR
POSTSCRIPT
COMPATIBLE.**

PC & MAC.

\$4995.

Tom Adams
President

Brian Chu
Executive V.P.

Joe Hayes
Dept. Manager

Tektronix introduces the first color printer that's software-based PostScript-compatible for less than \$5000. Our new Phaser II SX is great for individuals or small groups. It works with Windows 3.0 or Macintosh QuickDraw using brilliant 300 dpi thermal-wax color.

For bigger businesses, we have the Phaser II PX. It's PostScript-compatible with HP-GL and licensed by Pantone. It works with Macs, PCs, and UNIX

workstations. At the same time. And, like all our other printers, it's upgradeable so you'll never outgrow it.

So give us a call at 1-800-835-6100, Dept. 14E for more information. Because no other color printer looks this good on paper.



Tektronix.
The best and the brightest.

CIRCLE 477 ON READER SERVICE CARD

PostScript is a registered trademark of Adobe Systems, Inc. Phaser is a trademark of Tektronix, Inc. Copyright © 1991 Tektronix, Inc. All rights reserved.

GRAPHICS VECTOR CLIP ART

satellite dish and the space shuttle. The computer images are so specific that they are listed by brand name: You can find a

Once you understand that each grouping of images in the manual corresponds to a subdirectory on the disk, you can copy a file to your hard drive in a jiffy.

PS/2 and an AT, the various versions of Apple's Macintosh, modems, laser printers, and several VAX terminals.

Business 1 also contains images of people dressed appropriately for work,

but they are limited in number and don't contain a diversity of ethnic types. They are not highly detailed, which makes them easy to recolor, but because the images are usually composed of one very large silhouette that encompasses suit jackets, pants, shoes, and even briefcases, reshaping the outline to move arms or to separate a jacket is a real chore.

The selection of other types of images could be better. One car, one 18-wheel truck, one plane, and one ocean liner don't constitute a broad collection of travel images. The PC Labs tests called for a map of Europe, which just doesn't exist in this library. Even worse, the map of the United States is a simple outline that doesn't let you select individual states.

DTP users will welcome the selection of detailed dingbats, icons, and decorative boxes in the Accents and Borders 1 collection. However, the highly simplified images in Graphics and Symbols 1 are useful only for chart icons and pictograms.

With the exception of a bonus disk containing color bullets and borders, all of

3G Graphics' images are monochrome. Flat shades of gray give detail to the pictures, and the few objects that use gradient fills do so with lots of individual objects that simulate a true gradient. The individual elements that form a picture are often subgrouped according to "color," meaning shades of gray. For example, ungroup a vine border and you'll find that all the leaves are subgrouped, so when you change the attribute from light gray to green, all the leaves are modified.

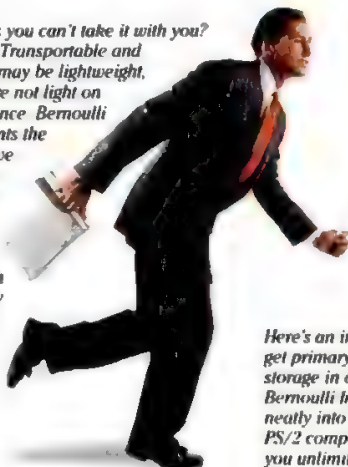
Based on the sample images that we saw, the new People 1 volume, which adds color images and logical nested groupings, should dramatically increase the number and kinds of people images available for clipping. These groupings will allow you to ungroup a scene with four people and rearrange them; you can also ungroup an individual person to find that the hands and face are a single group, making it a snap to change skin tones. However, even these new images are much simpler in appearance than the pictures of equipment. Their generalized silhouettes remain a problem.

Images With Impact! has one aesthetic problem: The pictures of computers and



The computing world is a changing place. That's why our new family of universal removable storage products can be easily attached to today's newest systems. Our Parallel Port Interface even connects Bernoulli® to computers without an expansion slot or SCSI port.

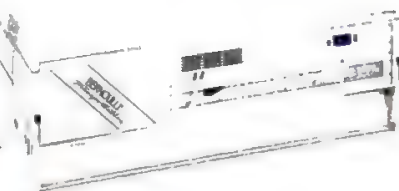
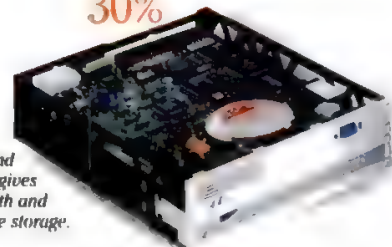
Who says you can't take it with you? The new Transportable and Portable may be lightweight, but they're not light on performance. Bernoulli implements the latest drive enhancements to help you keep pace with your busy schedule.



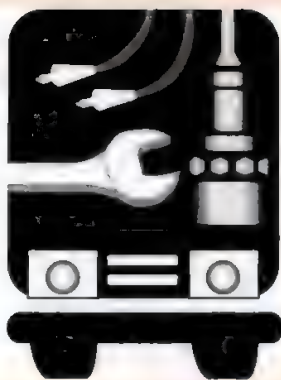
Bernoulli brought worry-free storage to everyone—now you can take it everywhere. Our new Transportable packs all the power and data security of our 44MB removable disk drive into a convenient, AC-powered unit.

PRICES
REDUCED
UP TO
30%

Here's an inside scoop. get primary and backup storage in one. The Bernoulli Insider fits neatly into leading PC and PS/2 computers. Plus, it gives you unlimited data growth and the security of removable storage.



GRAPHICS VECTOR CLIP ART



The auto mechanics icon is just one of many objects from *Images With Impact!* that can be ungrouped into elements that can be used on their own. However, the naming conventions used in this library turn sensible descriptions like Man on the Run into **M_OnRun.eps**.



high tech hardware are more elegant and sophisticated than the pictures of people. The images are so logically constructed

that even inexperienced users can edit and color them without difficulty, so they're useful for many situations.

MICROGRAFX INC. Micrografx ClipArt

by James Karney

Whatever the image you're looking for, chances are you'll find it in one of the *Micrografx ClipArt* libraries. The images range from an extensive collection of simple symbols to impressive color maps and anatomy drawings. All the files are saved in the proprietary Micrografx .DRW format, which is good news for *Micrografx Designer* fans but a tough break for those who want to use this more complex artwork in other programs.

The images are arranged into collections devoted to a single subject. There are four *ClipArt* collections priced at \$249.95 each; three Special Editions priced at \$149.95 each; and 19 smaller Standard Editions priced at \$79.95 each. The Standard Editions include typefaces, architectural symbols, dingbats, borders, and business forms.

The complexity of the images and their file sizes varies. For example, the Technical collection includes a host of drafting symbols grouped into sets. The Desktop

ERNOULLI. TIME. ANY PLACE.

You don't have to pamper a Bernoulli. Its patented design flies a flexible disk precisely under the read/write head. Should your system encounter a bump, air impurity, or power loss, the disk simply falls away. The result? Hard-disk performance without the risks.



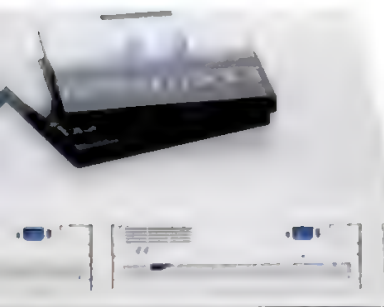
With all the computing choices out there, why limit your options? Our new universality is a unique innovation that lets you easily attach the same Bernoulli to most any system, giving your data (and budget) protection for tomorrow.

Bernoulli's removable disks are the most rugged available. And we back that up with an unheard-of 5-year Gold Standard Limited Warranty.

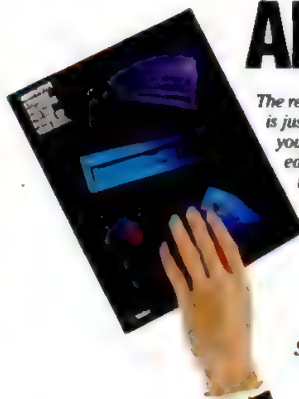


BERNOULLI AT A GLANCE

- Disk Configuration -**
 - 5.25" half-height 44 MB
- Drive Configurations -**
 - single or dual (internal or external)
 - battery-powered portable
- Effective Access Time -**
 - 22 msec
- Disk Shock -**
 - 1,000 Gs
- Mean Time Between Failure -**
 - 60,000 hrs.
- Compatibility -**
 - DOS, PC, 1/2/2e
 - Macintosh, OS/2
 - Windows, NetWare, UNIX
- Installed Base -**
 - 625,000 drives
 - 3,770,000 disks
- InfoWorld Buyers Assurance Seal**



For the truly power hungry, the Bernoulli Dual gives you up to 89MB of removable on-line storage with a 22msec effective access time and unlimited off-line capacity. It makes disk-to-disk copies in under three minutes. That's performance for the real world—at a price that's been reduced up to 30 percent.



ANY QUESTIONS?

The rest of the Bernoulli story—including our new, lower prices—is just a phone call away. Dial 1-800-777-3488 for the location of your nearest dealer and we'll rush you a free copy of this limited-edition, 18-page brochure. It's packed with everything you need to know about removable data storage. Any way you like it.

MEGA
The Makers of Bernoulli

See us at Spring COMDEX/Windows World '91 Booth 3134.
CIRCLE 378 ON READER SERVICE CARD

Seagate and Novell Join Forces for First NetWare Ready® Disc Drives.

It shouldn't surprise you. Seagate and Novell together announce an important new development in storage for network computing. The first NetWare Ready® disc drives. NetWare Ready Wren® disc drives from Seagate.

Now truly NetWare Ready drives can be



installed in minutes in network file servers for Novell systems. That saves you from the time and expense of lengthy CompSurf processing.

Only NetWare Ready Wren drives pass demanding lab tests by technical quality teams at both Seagate and Novell. The result is a special factory-recorded NetWare Ready signature that is immediately recognized by NetWare operating systems.

Not only have these drives undergone months of Novell's rigorous lab testing requirements, but Seagate's automated manufacturing and test processes ensure that every drive shipped meets the NetWare standard.

Our family of NetWare Ready Wren drives is available now in 376 and 766 megabyte capacities. An additional series of Wren SCSI, half-height and full-height models—from 125 to 1,200 megabytes—is currently undergoing NetWare Ready qualification. When Seagate and Novell join forces, NetWare operating system installers and managers know that two tough quality teams have just made life easier.



For complete details, call Seagate 800-468-DISC or 408-438-6550.

We're ready when you are.

 **Seagate**
The first name in disc drives

Novell, NetWare and NetWare Ready are registered trademarks of Novell, Inc. The NetWare Ready logo is a trademark of Novell, Inc. Wren, Seagate and the Seagate logo are registered trademarks of Seagate Technology, Inc. © 1990 Seagate Technology, Inc.

Publishing collection has a wide variety of arrows, borders, and dingbats, while the Personal collection includes cartoon figures (and parts that can be combined), people, sports subjects, and transportation equipment. The U.S. and World Geography Special Editions have an excellent selection of color maps that can be broken down, and the Anatomy Special Edition has an impressive collection of medical illustrations of the various systems of the human body.

The drawings in the collection were all created directly using *Micrografx Designer*; as a consequence they are generally easy to modify and color. The quality of most of the illustrations (such as maps, anatomy drawings, and hardware objects) are excellent. The symbol sets, however, seem aimed at drafting applications rather than commercial art use. The images of people often seem less sophisticated than you would expect, given the overall quality of the collections.

NO EASY EXPORTS

If you use *Micrografx Designer* or one of the other graphics programs from Micrografx, you'll have no problem importing, modifying, and manipulating the

GRAPHICS VECTOR CLIP ART

clip art since the images are in its native vector format. You can use any of the host program's shaping and color tools, then output using any *Windows*-compatible device.

Exporting *Micrografx ClipArt* is not always easy, though. The symbol sets are generally small and can be easily moved using the *Windows* clipboard. More involved drawings, such as those in the anatomy set, contain several layers and detailed color schemes, making them harder to export.

An illustration of a hand from the anatomy set took 5 minutes to convert from .DRW to CGM format, and the resulting file would not import into *PageMaker*. An EPS export did, but with noticeable flaws in parts of the drawing. Some of the text was also improperly converted into an italic font during the process. An EPS export of the same file could not be brought into *CorelDRAW*, but the CGM conversion that failed to load in *PageMaker* worked without problems in *CorelDRAW*. The *Windows* version of *Ventura Publisher* imported both conversions and printed the CGM file



FACT FILE

Micrografx ClipArt

Micrografx Inc.,
1303 E. Arapaho
Rd., Richardson, TX
75081; 800-733-
3729, 214-234-1769.

Formats: Micrografx (.DRW)

List Price: Collections: Business (300 images), Personal (300 images), Technical (350 images), and Desktop Publishing (700 images), \$249.95 each. Special Editions: Anatomy (150 images), World Geography (150 images), U.S. Maps (600 images), \$149.95 each. Standard Editions, \$79.95 each.

In Short: With images ranging from simple symbols to impressive color maps, all in the proprietary Micrografx .DRW format, these libraries are a boon to *Designer* fans. Export problems make them less than ideal for use in other graphics programs, though.

CIRCLE 804 ON READER SERVICE CARD



easily, but the EPS file looked very coarse.

Each collection includes a single paper catalog covering all Micrografx clip art, but it does not list all of the available images. This can be a drawback for someone without a copy of *Micrografx Designer*. *Designer* users can invoke the clip-art option from the Files Menu to see a list of titles or preview images. The Micrografx Portfolio utility bundled with the clip art has the same capabilities, but at the time of testing had not been updated to work with *Microsoft Windows 3.0*.

The *Micrografx ClipArt* collections are an excellent choice for users of the company's software products such as *Micrografx Designer* and *Charisma*. They gather generally well-designed and accurate illustrations that can be easily modified. But, users planning to export the finished work to another program should test similar files before making a large investment.

HIRED HAND DESIGN

Moonlight Artworks Collection

by David Dean

The folks at Hired Hand Design like to consider themselves clip-art guns for hire. Their scanning and digitization services have led to three *Moonlight Artworks Collection* libraries: PC Set 1, Holiday, and Logo Master (\$49 each, or three for \$99). The PC library has a sampling of business



The complexity of the images in the *Micrografx ClipArt* collections varies. The quality of the anatomy and technical drawings is excellent, but some other images are not as sophisticated.



CALL NOW • 1-800-258-8088 • THE PC ZONE



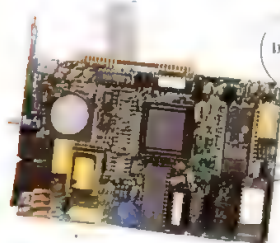
Call us for PC Hardware

We can make your system hum with the best



ProModem 2400B

One 9600 Internal Modem for IBM PC, XT, AT and compatibles



PROMETHEUS

Prometheus ProModem

A complete communications solution! This combination 2400 bps data/9600 bps send and receive, group 3 fax modem includes Mirror II™ communications software and fax software, plus a two-year warranty and free technical support.

24/96 BSR \$199

MODEMS

Cardinal	
1200 Baud Internal Modem	64
2400 Baud External Modem	168
2400 Baud Internal Modem	78
2400 Baud MNP-5 Internal Modem	158
CompuServe	
Membership Kit	18
Crosstalk Communications	
Crosstalk Communicator	58
Remote II 2.0	106
Datastorm Technologies	
Procomm 2.0	74
Dynamic Microprocessor Association	
PC Anywhere IV	108
Hayes	
Smartcom Exec 2.0	78
Hilgrave	
Hyperaccess/5 1.1	114
MicroCom	
Carbon Copy Plus 5.2	100
Relay Gold 4.0	160

Practical Peripherals	
Practical Modems	
1200 Internal	63
1200Sa Mini	78
2400 Internal	135
2400 V.42Bis	195
2400Sa	219
2400Sa V.42Bis	239
9600 Sa	488
Pocket Modem 2400	105
Prodigy	
Start Up Kit For PC	24
Prometheus	
ProModem 2400 Mini	125
ProModem 9600+	630
Ultima 14.4	6.99
Telebit	
T-1000 9600 Bps Modem	549
The Complete PC	
The Complete Fax 9600	404
U.S. Robotics	
Courier Hst Modem 14.400	624
Intel	
Intel Satisfaction Fax Board	389



Mouse Systems PC Mouse III

Extends resolution, reliability, ergonomics and accuracy to new highs. Select from 30 to 30,000 cpi resolution using the world's most advanced optical mouse technology. Accurate to within 1%: five to ten times more accurate than mechanical mice. With three buttons, and triple protocol selectable software it can work with any system.

Mouse III Serial	\$82
Mouse III Bus	\$90

Microtouch UnMouse

Does everything a mouse can—only faster and easier. Simply slide your finger over the glass. Also serves as an extended keyboard. The included Power Keypad software can execute up to 60 macros. With one million touch points, it even performs well as a graphics tablet.

UnMouse \$180



INPUT DEVICES

9600 Baud, Inc.		Microsoft Corporation	
Maxx Pedals Joystick	55	Bus Mouse/Windows	148
Maxx Yoke Joystick	79	Serial Mouse	89
Advanced Gravis		Serial Mouse W/ Wind 3.0	145
Joystick - Black	39	Microspeed Inc.	
Anniv. Ed. Joystick - Clear	45	PC Trackball-Serial	70
Fujitsu		Mouse Systems	
Fujitsu 4700 Keyboard - PC	69	Omni Mouse II Bus Version	59
Keytronics		Pagebrush Hand Scanner	175
KB 101 Keyboard For The PC	85	PC Mouse III Bus Version	92
Logitech		Trackball Mouse Bus Version	65
Mouseman		Summagraphics	
Cordless Radio	129	Summasketch For The PC	398
Lefthand, Righthand - Bus	70	The Complete PC	
Lefthand, Righthand - Serial	65	Complete PC Hand Scan	168
Trackman Trackball - Bus	88	Z-Nix	
Microsoft Corporation		Super Mouse II w/ Win 3.0	95
Bus Mouse For PC	88		

Logitech Cordless Radio MouseMan

The Cordless Radio Mouse takes input technology to a new dimension. Perfectly fitted to your hand, its radio-wave computer link makes communication effortless. Guaranteed compatible with all your application software.



Cordless MouseMan ... \$129

SYSTEMS

Advanced Logic Research	
Powerflex 286	1155
Bus. VEISA 386 Mod 101	1815
Powerflex 386sx Mod 40	1335
Powerflex 386sx Mod 1	1065
AST Research	
Premium 386sx 5V	1925
Bravo 386sx 5V	1625
Bravo 286 Model 5	899
Toshiba Laptops	
Many models available, call for pricing.	

MEMORY & STORAGE MEDIA

Boca Research	
Bocaram At Plus (OK)	124
Elite Business Apps	
Ramjet 2 Mb Memory Upgr.	175
Memory Chips	
1 Mb Dram 80Ns (Set Of 9)	80
1 Mb SIMM 80Ns	84
256K Dram 80Ns (Set Of 9)	24
256K SIMMS 120Ns	31
Pacific Data	
Pacific 4 Memory 4Mb	369

Maxell Corporation Of America	
MD2-DD 360K 5.25 Disks	8
MD2-DD 360K Preformat	12
MD2-HD 1.2M 5.25 Disks	17
MD2-HD 1.2M Preformat	23
MF2-DD 800K 3.5 Disks	11
MF2-HD 1.4M 3.5 Disks	19
Sony Corp. Of America	
1.2M 5.25 Disks, 10Pk	18
360K 5.25 Disks, 10Pk	9



Cardinal 2400 Baud External Modem

Powerful 2400baud external modem. 100% Hayes Compatible. Operates at 2400, 1200, and 300 baud. Proven technology, design. Made in USA.

External Modem \$84

Qualitas 386 MAX 5.1 or BlueMAX

Get more memory and maximize system performance automatically! Load memory resident programs into unused regions between 640K and 1MB. BlueMAX provides more memory for 386 PS/2 systems than any other memory manager.

386 MAX 5.1	\$69
BlueMax.	\$75



MONITORS & VIDEO BOARDS

Emerson	
14" Paper White Vga Monitor	99
Everex Systems	
EversyncColor Mon.	499
NEC Technologies	
Multisync 2A	495
Multisync 3D	665
Video Seven	
V-RamVga Color Board	378
Zenith Data Systems	
ZCM-1492 FTM VGA	645
IDEK - PC Mag Editor's Choice!	
17" Color Monitor & 24 bit Color Super VGA Card Bundle	1800

NETWORKING

Arisoft / Lantastic	
Ethernet Adapter Crd	260
Ethernet Starter Kit	540
Dayna Communications Inc.	
DaynaTalk For ISA	200
DaynaTalk For MCA	250
Traveling Software	
Desk Link 2.21	95
Laplank III For The PC	84
View Link 1.0	83
Xircor	
Coax Arcnet Adapter	290
Coax Ethernet Adapter	425
Twisted Pair Ethernet	425

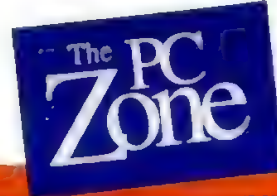
DRIVES

NEC Home Electronics	
CD-R2 Intl CD ROM Drv	480
PLI	
Fast Card Xv/At SCSI Adapt	219
Seagate	
HD 20 Mb Int W/Ctrlr	263
HD 40 Mb Int Ide	354
HD 80 Mb Int SCSI	618
Controller Cards	
St01 SCSI	25
St02 SCSI + Fdc	39
St07A Ide	23
St08A Ide + Fdc	35
St11M 8 Bit Mfm	59
Stac Electronics	
Stacker	89
Tenc	
40Mb IDE HD W/Cont'r	279
Toshiba	
106Mb IDE HD W/Cont'r	535
Plus Development	
Hardcard II XL 105meg	669
Hardcard II XL 50 meg	389
Impulse 84mb IDE	529
Impulse 42mb IDE	329
IOmega	
Bernoulli Transportable 44	989
Bernoulli Internal 44	959

The Windows Experts

Get the MOST from the new PC environment

WINDOWS SOFTWARE



Abacus	
Becker Tools For Windows	79
Absolute Solutions	
Computerized Class Actng	299
Adobe Systems Inc.	
Adobe Type Manager	58
Adobe Type Set 1	58
Adobe Type Set 2	58
Adobe Type Set 3	118
ATM Windows Plus Package 108	
Illustrator Windows 1.0	278
Aldus Corp.	
Aldus Pagemaker 4.0	488
Aristocad	
More Windows 1.0	65
Asd Software Inc.	
Planissoft For The Pc	138
Asymetrix Corp.	
Toolbook For Windows	294
Atech	
Publishers Power Pack	44
Bell Atlantic	
Thinix	299
Berkley Systems Design	
After Dark For Pc - Dual	28
Bitstream Inc.	
Face Lift For Windows 3.0	57
Facelift Value Pak	118
Blyth Software	
Omnis 5 For Windows	532

Borland	
Borland Objectvision	99
Broderbund	
Dragnet 1.0 - Access Softtek	81
Prompt 1.0 - Access Softtek	73
Brown-Wagh Publishing	
More Fonts For Windows	95
Caere Corporation	
Omnipage 386 Prof 1.0	649
Omnipage 386 V3.0	450
Corel Systems	
Corel Draw 2.0	365
Crosstalk Communications	
Crosstalk For Windows	128
Dariana Technologies	
Win Sleuth For Windows	82
Delrina Technology	
Performpro For Windows	262
Digital	
Smalltalk V Windows	299
Foresight Resources	
Dratix Cad For Windows	444
Formworx Corporation	
Form Publisher 1.2	265
Formworx With Fill & File 2.5	81
hDC Computer	
First Apps For Windows	48
Icon Designer	31
Windows Express	48

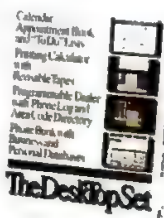
Hewlett Packard	
New Wave 3.0	125
Individual Software	
Professor Windows	26
Informix	
Wingz For Windows	303
Merril & Bryan	
Turbo Ems 6.0 For Windows	64
Micrografix	
Charisma For Windows	343
Designer 3.01	454
Microsoft Corporation	
Excel 3.0 For Windows	308
Microsoft Office	669
Powerpoint For Windows	308
Project For Windows	454
Windows 3.0 Dev Kit	324
Windows Device Driver Kit	365
Windows Entertainment Pack	28
Windows Productivity Pack	37
Word For Windows 1.1	304
Mullinell	
Pc Kwik Powerpak 2.0	68
Super Pc Kwik 4.0	42
Numbers & Co.	
Whiskers Mouse Utility	22
OCR Systems	
Readright for Windows	call

Okna Corporation	
The Desktop Set	85
Owl International	
Owl Guide 3.0	378
Precision Software	
Superbase 4.1.2	408
Prisma Software	
Yourway	125
Publishing Technologies	
File Organizer	125
Reference Software	
Grammatik Windows 1.0	59
Lotus	
Ami Professional	304
Softview	
Macintax For Windows	74
Software Ventures	
Microphone II	214
Spinnaker	
Spinnaker Plus 2.0	275
Threadz Software Design	
Threadz File F/X	74
Ventura Software - Xerox	
Ventura Publisher Gold 3.0	530
Zenographics, Inc.	
Super Print 1.1/HP Laser	113

DeskTop Set for Windows

A personal and business organizer that combines essential programs into a powerful, flexible and easy-to-use system. Features include Calendar, Appointment Book, To-Do Lists, Printing Calculator, Programmable Dialer and Phone Books. Perfect for consultants, salesman, or anyone who uses the phone in business.

DeskTop Set for Windows\$83



SPC Professional Write PLUS for Windows

The Windows word processor that improves productivity. Unique Icon commands cut through complicated menus. Exploits Windows with WYSIWYG graphics and hot-links. Includes built-in grammar checker and E-mail front end. Perfect for all your word processing needs.

Professional Write PLUS\$165

FormWorx Form Publisher for Windows

If you work with government contracts or forms you must have this program. Fully WYSIWYG. Features: adjustable ruler, snap-to grids, zoom levels, irregular line spacing allowed. Compile forms in HP macro format. Includes over 550 standard government and business forms.

Form Publisher for Windows\$125



Lasertools PrintCache 2.4

Fastest print buffering product available for IBM PCs—gets you back to work with amazing speed while running your printer or plotter as fast as it can go. Perfect for printing graphics, desktop publishing, plotting, or printing long spreadsheets and reports.

PrintCache 2.4\$98

Dariana WinSleuth or SystemSleuth Pro

WinSleuth helps resolve conflicts in the Windows 3.0 environment. View memory, disk drive, network statistics and more. SystemSleuth Pro analysis and diagnoses conflicts in the DOS environment. Examine system configuration and on AT class machines test video, system board, disk drives, memory, keyboard and much more..

WinSleuth or SystemSleuth Pro\$82



Delrina WINFAX

If you can print it, you can fax it! Create and transmit faxes from any Windows 3 application. Installs as a Windows printer driver so that it is extremely easy to use. Combine output from different applications into a single outgoing fax. Integrated Phone Book, background operation and many other features.

WINFAX\$41



UTILITIES

Above Software		Funk Software	
Above Disk 4.0	54	Sideways 3.3	55
American Megatrends Inc		Gazelle Systems	
Amidiag	59	Back It! V4.0	69
Application Techniques		Optune 1.2	42
Pizzazz Plus	64	Gibson Research	
Bloc Publishing		Spinrite II V1.1	64
Print Rite 1.3	58	Helix	
Print Vision 2.0	44	Headroom 2.0	66
Broderbund		Netroom	39
Memorymate 3.02	37	Insight Development Corp	
Central Point Software		Print A Plot 2.0	188
Central Point Backup	59	Printtools 1.0	84
Copy II Pc 6.0	21	Lasertools	
Copy II Pc Dlx Option Board	120	Printcache 2.4	98
Pc Tools Deluxe 6.0	84	Merril & Bryan	
Dariana Technologies		Turbo Ems	55
System Sleuth Pro For The Pc	82	Microcom	
Fifth Generation		Virex Pc	67
Brooklyn Bridge 3.0	81	Ontrack	
Extra	53	Disk Manager Dos 4.2	48
Fastback Plus 2.1	108	Personics	
Mace Utilities 1990	84	Ultravision 2.0 For Ega Or Vga 78	
Pyro 1.0 For Pc	30	Prime Solutions	
Fischer		Disk Technician Gold	92
Watchdog	169	Qms	
Funk Software		Ultrascript Pc Plus 2.0	248
Pd Queue	53		

Qualitas	
386 Max 5.1	69
Blue Max 5.1	75
Quarterdeck Office Systems	
Qemm 5.1	58
Qram 1.0	46
Sitback Technologies	
Sitback Backup Utility	62
Software Directions	
Print Q 5.0	82
Softsafe 2.0	78
Spinnaker	
Pts: Preface	48
Symantec	
Norton Anti-Virus	87
Norton Commander 3.0	85
Norton Utilities Adv5.0	108
The Norton Backup 1.2	92
The Software Toolworks	
Toolworks Backup Pro	36
Touchstone	
Check-It! 3.0	78
Traveling Software	
Battery Watch 2.0 (3.5"disks)	26
Westlake Data	
Westlake Value Pack	63
Xtree Company	
Xtree Gold V.2.0	89

- We accept Visa, MasterCard, Discover, American Express, and wire transfer.
- Your credit card will not be charged until order ships
- PO's accepted subject to credit approval
- No sales tax (except WA. residents 8.2%)
- We reserve the right to limit quantities
- Prices, terms, and product availability subject to change without notice
- All products covered by a 120 day limited warranty in addition to manufacturer's warranty. Defective software replaced immediately. Hardware replaced or repaired at our discretion.
- Airborne Express overnight delivery add \$6 per order (up to 7 lbs. add \$1 each additional pound) Alaska and Hawaii included
- UPS Ground shipping \$3 in continental US COD orders add \$5 per order.
- International orders pay actual shipping and handling
- Orders placed by 9:00pm Eastern Time, 6:00pm Pacific Time (weekdays) for "in stock" items, ship same day (barring system failure, etc.)

18005 NE 68th Street, Suite A110, Redmond, WA 98052
Outside U.S. (206) 883-3088 • Fax (206) 881-3421

CALL NOW • 1-800-258-8088 • THE PC ZONE

CALL NOW • 1-800-258-8088 • THE PC ZONE



Over 800 best-sellers in stock

Call for our complete product listings



MicroRim Personal R:BASE
This fully relational database offers you a unique blend of quick start-up, ease of use, great value for your money plus the ability to grow as your data management needs expand. It also includes

many useful sample utilities to help get you started simply.
Personal R:BASE \$95

PROGRAMMING

Borland International	Microsoft Corporation
Borland Turbo C++ V2.0 329	Basic Prof. Dev. System 7.1 298
Turbo Assembler/Debugger 94	C Compiler 6.0 306
Pascal Professional 6.0 190	Macro Assembler 5.1 90
Digital	Quick C 2.5 60
SmallTalk/V 2.0 58	Quick Pascal 1.0 62
SmallTalk/V 286 1.1 118	Quickbasic 4.5 60
Harvard Associates	Multiscope
PC Logo 3.0 51	Multiscope Debugger/Dos 125
Spectra Publishing	Personal Bibliographic
Power Basic 2.0 78	Procite 1.41 265

GAMES

Accolade	Broderbund
Hardball II 29	Sim Earth 39
Jack Nicklaus Unlimited Golf 35	Origin
Electronic Arts	Ultima VI For PC 45
Centurion: Defender Of Rome 40	Wing Commander For PC 45
Hunt For Red October 18	Secret Missions 20
Microsoft Corporation	Symtux Limited
Aircraft & Scenery Design Kit 28	Cybergenic Ranger 49
Flight Simulator 4.0 For PC 36	Xor
	Basketball Challenge For PC 25



Zondervan NIV^{PC}
Adds incredible research capabilities to Bible study with complete text of New Internat'l Version and eclectic, critical Greek NT. Compare passages,

parables and texts. Search for a specific word and access any verse, phrase or word combination. Searches in English, Greek, or even across languages!

NIV^{PC} \$99

MUSIC

Activision
The Music Studio 3.0 58
Ad Lib
Ad Lib Music Card 95
Dynaware U.S.A., Inc.
Dynaware Ballade 2.0 116
Dynaware DynaDuet 145
Ibis Software
Play It By Ear 60
Passport Designs
Encore! 495
Master Tracks Pro 395
Tracks 99
Brown-Wagh Publishing
Sound Blaster 1.5 164

Systems Compatibility The Complete Writer's Toolkit

Six of the finest writer's tools combined in one software package. Provides five pop-up reference tools: Dictionaries of Definitions and Quotations, Thesaurus, Abbreviations, Grammar & Style Guide, and sophisticated grammar checker.

The Complete Writer's Toolkit \$79

BUSINESS & FINANCE

Alpha Software	Fox Software	Pacioli
Alpha Four 1.1 298	Fox Professional 439	Pacioli 2000 32
AISB	Funk Software	Patton & Patton Software
How To Write A Bus. Plan 90	Always 1.0 104	Flow Charting III+ 138
Ashton Tate	Igc	PC Globe, Inc.
Dbase IV 1.1 478	Vm 386 V1.22 144	PC Globe 4.0 34
Askam Systems	Individual Software	PC U.S.A. 34
Askam 4.2 158	Resume Maker 1.1 28	Peachtree Software
Avery Labels	Informix	Peachtree Complete III 141
Avery Labelpro 43	Smartware II w/Spellcheck 428	Peachtree Complete III Double Bonus/Bundle 209
Banner Blue Software	Intuit	Power Up
Family Tree Maker 1.0 38	Quicken 4.0 34	Address Book Plus For PC 61
Bloc Publishing	Expertise	Calendar Creator Plus 38
Form Filler 3.0 77	PC Proof 97	Name That Disk 31
Form Tool Gold 3.0 52	Logitech	Quick Schedule Plus For PC 48
Borland International	Catchword 134	Reality Technologies
Paradox 3.5 498	Lotus Corp.	WealthBuilder 1.1 131
Quattro Pro 2.0 309	Lotus 1-2-3 Rel 3.1 428	WealthStarter 52
Brown Bag Software	Meca Ventures	Reference Software
PC Outline 60	Manager'S Organizer 143	Grammatik IV 1.0 46
Buttonware	Tax Cut 1990 44	Rightsoft
PC File 5.0 72	Managing Your Money 7.0 125	Rightwriter 4.0 52
Chronologic Corp.	Merril & Bryan	Software Publishing
Instant Recall 1.2 49	Info Spotter 49	Harvard Project Mgr 3.01 386
Chronos Software	Micrologic	Professional Write 2.2 139
Who What When 2.0 178	Info Select 54	Spinnaker
Clarion	MicroRim	Pis: First Choice 3.02 91
Professional Developer 475	R:BASE 3.1 Single User 465	Symantec
Contact Software Int'l	R:BASE Personal 75	Norton Editor 2.0 63
Act! 2.0 232	Microsoft Corporation	Q&A 3.0 215
Dataease International	Word 5.5 For PC 208	Time Line 4.0 438
Dataease 4.2 475	Works 2.0 For The PC 91	Systems Compatibility
Delrina Technology	Mosaic Marketing	Outside In 64
Perform Design/Filler 2.1 140	Twin Level III 122	Software Bridge 4.1 71
Delta Technology	MySoftware	The Software ToolWorks
Direct Access 5.0 58	My Advanced Mail List 30	Office Manager 28
Direct Net 144	My Business Checkbook 25	TimeSlips
Enable Software	My Invoice For PC 15	TimeSlips III 4.0 168
Enable/Bp 118	Nantucket Corporation	Wolfram Research, Inc.
Enable/Oa 408	Clipper 5.0 498	Mathematica 386 669
Famware	Nolo Press	Word Science
Family Reunion 38	Willmaker 4.0 For The PC 33	Definitions Plus! 68
Fastrax International	Olduvai	WordPerfect
Fastrax 4.0 44	Read-It OCR Personal 145	LetterPerfect® 1.0 121
Formgen Corp.	On The Go Software	WordPerfect 5.1 244
Formgen Plus 5.0 138	Expense It! 81	Office 3.0 85
FormWorx Corporation		Rhymer 50
FormWorx 2.5 w/Fill&File 81		

Microtac Spanish Assistant

This amazing utility will translate ASCII format letters from English to Spanish. And its powerful memory-resident reference tools and handy interactive translator help write, study and translate English to Spanish. Conjugate verbs, pop up translations for English or Spanish words, add accented characters, translate from English to Spanish, and more!

Spanish Assistant \$49

WordPerfect 5.1

The power, flexibility and ease of use of WordPerfect have made it the world's best-selling word processor. New advanced features, additions to old favorites and outstanding toll-free customer support continue the tradition of excellence.

WordPerfect \$244



OPERATING SYSTEMS

Berkeley Geoworks	Gazelle Systems
Geoworks Ensemble 125	Q Dos III 44
Digital Research	Microsoft
Dr Dos 5.0 145	Windows 3.0 87
Soflogic Solutions	Quarterdeck Office Systems
Double Dos 5.0 44	Desqview 2.3 75
Software Carousel 5.0 47	Desqview 386 2.3 126

Desktop Publishing at PC Zone

Rival the best with our outstanding Graphics and Fonts

GRAPHICS AND DESIGN

3G Graphics

Images W/Impact Business 1	58
Images W/Impact	
Grphcs&Symbols	58

American Small Business Co.

Design Cad 2D V 4.2	155
Design Cad 3D V 3.1	187

Application Techniques

PicturEze	99
-----------	----

Artright

Artright Images Vol. 1	78
Artright Images Vol. 2	78

Autodesk, Inc.

Animator	238
Autosketch 3.0	142

Market Street Software

Laser Grip Graphic Print Util.	75
--------------------------------	----

Brightbill Roberts

Show Partner F/X 3.6	223
----------------------	-----

Bruderbund

BannerMania	20
New Print Shop Companion	29
New Print Shop For The PC	34

Inset Systems

Hijaak 2.0	120
------------	-----

Computereasy Software

Dream House Professional	46
Floor Plan	25

Custom Applications

Freedom Of Press Lite	60
Freedom Of Press	238

Digital Composition

Db Publisher Profess. 2.1	398
---------------------------	-----

Digital Research

Gem Artline	268
Gem Presentation Team 2.0	278

Electronic Arts

Deluxe Paint II (Enhanced)	75
----------------------------	----

Foresight Resources

Drafix Cad Ultra	231
------------------	-----

Generic Software

Basic Home Design : Symbols 30	
--------------------------------	--

Generic Cad

3D Drafting For PC	178
--------------------	-----

Generic Cad

Cad 5.0	299
Auto Convert 5.0	58
Lvl 3 W/ Dot Plot	208

Lotus Corp.

Freelance Plus 3.01	310
---------------------	-----

Mathsoft

Mathcad 2.5	292
-------------	-----

NEC Home Electronics

Clip Art 3D CD ROM	258
Image Folio CD ROM	249
Photo Gallery CD ROM	258

PC Publishing

Impress 2.0	68
-------------	----

Power Up

Express Publisher 2.0	82
-----------------------	----

Spinmaker

Pfs: First Publisher 3.0	83
--------------------------	----

Software Publishing

Harvard Graphics 2.3	299
----------------------	-----

Symsoft Corp.

Hot Shot Graphics	149
-------------------	-----

T Maker

Christian Images/Windows	44
Click Art Business Images	45
Click Art Holidays	45
Clickart Business Cartoons	41
Clickart Eps Business Art	79
Eps Illustrations	84
Holiday Images/Windows	44
Personal Graphics/Windows	44
Publications/Windows	44

Timeworks

Publish It! 1.2	131
Publish It! Lite	32

Wordperfect Corporation

Wordperfect 1.1	268
-----------------	-----

Xerox

Gray F/X	304
----------	-----

Zenographics, Inc.

Pixie 2.0	164
-----------	-----

Z-Soft

Pc Paintbrush IV Plus	104
-----------------------	-----

DynaWare

DynaPerspective 2.0

One of the most powerful 3D modeling programs ever created. Its easy to learn 3D design, presentation and animation capabilities are beyond compare. Quickly model and present concepts with a complete range of 3D geometric primitives. Supports high resolution monitors, DXF import/export, layering, and plotting / printing capabilities.

DynaPerspective . \$599



EDUCATION

Bruderbund

The Playroom	24
--------------	----

Davidson & Associates

Math Blaster Mystery	29
New Math Blaster Plus	25

Hyperplot Software Co.

(German, Italian, Spanish, and French)	
--	--

Pronunciation	53
Tense Tutor	53
Word Torture	25

Simon And Schuster

Typing Tutor Iv+ For PC	26
-------------------------	----

Learning Company

Math Rabbit	23
Reader Rabbit	23
Writer Rabbit	25

Penton Overseas

French, German, Hebrew, Italian, Japanese, Russian, Spanish Level I, II, or III	38
---	----

True Basic

Algebra 4.0 + Wkbk	48
Calculus 4.0 + Workbook	48
Pre Calculus 4.0 + Workbook	48

The PC Zone and Adobe will help you create type with character

MedociScript

GARAMOND

Linoscript

Kunstler Script

Goudy

Souvenir

Futura

Aachen

WOOD ORNAMENTS

Wood Face 1

Adobe Type Libraries

Adobe is dedicated to the proposition that the better your printed communications look, the better you look. Now there are only a few good ways to produce electronic type. We believe, and most of the industry agrees, that Adobe has hit upon the best. So much so, that Adobe Type 1 font software has been the industry standard since the beginning. At the PC Zone we believe in Adobe and carry all their typefaces.

Since their goal is to build and maintain the largest, high-quality digital type library in the world, the fonts will continue to be an industry force. Type fonts are platform independent, too. They're available for IBM, IBM-compatible, Macintosh and NeXT machines. Now, what kinds of faces can you look forward to using? Either new, original designs, crafted at Adobe by their very own type experts, or faces licensed from the original type foundries. And, they only license

faces from the world's most renowned foundries to give you a selection unprecedented in number, variety and quality. So you see, while there may be alternatives to the Adobe Type Library, there are no substitutes. That's why we call it Type With Character.

We carry over 170 different font families. Please call for pricing

ADOBE Type Align

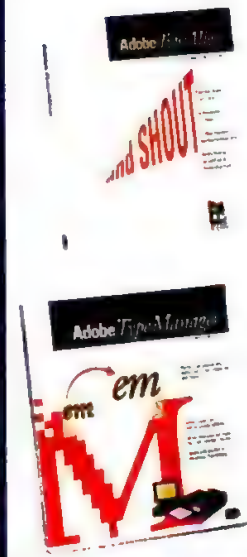
Type Align for Windows is a powerful desktop publishing and graphics tool for manipulating text. It allows you to stretch any text font to fit curves, spirals, circles, freehand drawing figures, etc. Very powerful, and very versatile, a must have for any design or graphics person. *Must have Type Manager to work.*

Type Align \$68

Adobe Type Manager

The tool that automatically makes your screen and printed text clearer. Easier to use than font generation software and offers more sizes and styles than cartridge products.

Type Manager \$58



Fonts

Adobe Systems Inc.

Adobe Postscript Cartridge	268
Adobe Type Cartridge 1	228
Adobe Type Cartridge 2	228

Atach

Publ. Power Pak Wp5.1/Word 44	
-------------------------------	--

Bitstream Inc.

Collections:	128
Face Lift For WordPerfect 5.1	57
Headlines 1-6	88

Elite Business Apps

25 Plus Charisma	275
Charisma Fonts	75

NEC Home Electronics

Type Gallery Lj CD ROM	258
Type Gallery PS CD ROM	258

Pacific Data

Outlines 1 For Hp Lj 3	198
Outlines 2 For Hp Lj 3	198
Page PE Postscript Crtg	388

CALL NOW • 1-800-258-8088 • THE PC ZONE

The Pocket LAN Adapters

Now Supports
3+ Open and Banyan

More Operating Systems. More Networks. More Convenience!

LAN connectivity can be a tangle of topologies, operating systems and wiring types. *Compatible* often seems more like *combustible*.

Xircom's family of Pocket LAN Adapters™ provides the widest range of network operating system support for Ethernet, Token Ring or Arcnet on all popular wiring.

Xircom's Pocket LAN Adapters remove the knotty problems associated with internal cards. By connecting externally through the parallel port of a laptop or desktop you'll side-step compatibility problems and the frustrations associated with jumper switches and address or interrupt conflicts. You'll have a hassle-free "plug-and-play" solution for putting any PC on a LAN.



In the universe of LANs there's only one truly convenient laptop connection. And it's from Xircom. It's the Pocket LAN Adapter.

So call us today at (818) 884-8755 for the dealer nearest you.

	Token Ring	Ethernet	Arcnet
Novell NetWare 286	▲	▲	▲
Novell NetWare 386	▲	▲	▲
3Com 3+	●	▲	
3Com 3+ Open	●	▲	
LAN Manager	●	▲	
Banyan Vines	▲	▲	●
FTP Software PC/TCP	▲	▲	
Wellengong WIN/TCP	●	▲	
10SET TCP/IP		▲	
NCSA TCP/IP		▲	
Sun PC-NFS		▲	
Locus PCI		▲	
NETBIOS	▲	▲	▲
IBM PC LAN	▲	▲	▲
Artisoft LANtastic	▲	▲	▲
Performance Technology		▲	●
CBIS Network-OS		●	
Digital DECnet-PCSA	●	▲	
Datability RAF		●	
DSC Nexos		▲	
Corvus PC-NOS		▲	

▲ Available Now
● In Development or Planned

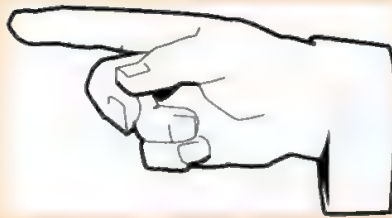
CIRCLE 211 ON READER SERVICE CARD

Xircom®
Simply Expanding Connectivity



22231 Mulholland Highway, Suite 114
Woodland Hills, CA 91364 • 818/884-8755
De Lescluzestraat 63 • 2600 Antwerp, Belgium
32(0)3 281-06-45

GRAPHICS VECTOR CLIP ART



The Moonlight Artworks Collection includes a large number of hand images, many of which could be used as dingbats, but the only PC image in the collection is a heavily stylized white-on-black reverse image. In general, this library is not strong on business images.



images, while the other two stick primarily to their topics, giving the *Moonlight* collection a fairly broad sampling of images. This art is aimed at business applications but is strongest in the areas of forms and advertisements.

The 395 images are evenly spread across the three libraries, but no image-management software is included. You may have trouble finding the images until you alert your software to the fact that the standard EPS extension is missing. The filenames do logically match the images contained in the three clip-art catalogs, however, which are organized by topic and disk.

PC Set 1 contains most of the general business images. Credit cards, a large set of hands, banners, form primitives, and a number of reverse (white-on-black) images are all included. The reverse images are of questionable utility, however. In design they're reminiscent of Day-Glo

foil bumper stickers; the majority of them are images of the sun or of wineglasses. The only PC included is one of these heavily stylized reverse images. While there are four generalized images of men and women, this library lacks professionals at work. Also missing are office scenes, office equipment, transportation, industrial facilities, and maps.

The Logo Master library is a collection of primitives that could be useful in a wide variety of spot art applications. Aside from the expected banners and geometric shapes, there are small collections of arrows, crowns, sailboat sails, and sign art. The sign art includes universal man, woman, and child symbols as well as highway map symbols. The Holiday library contains imagery useful for all the major holidays, as well as holly borders, snowflakes, and several gift boxes, bows, and tags. There is no political party or election paraphernalia.

A FOR EFFORT

The *Moonlight Artworks Collection* shows forethought and careful design in its wide array of images, but the execution is uneven. A large portion of each library consists of little more than geometric shapes that would take seconds to generate with the most rudimentary drawing tools. There is also a preponderance of black and white instead of the careful shading you'd expect from an EPS library.

The reverse images are good as spot art but are extremely difficult to color or break apart into useful objects. The standard images are easy to break apart for editing and coloring, but since most of the *Moonlight* images are intended for use as primitives, you are likely to find little need to edit them.

There is a good sampling of images here, and the quality will, in most cases, get the job done. Unfortunately, you're unlikely to find that one centerpiece image that catches the eye.

ISLANDVIEW/MGI PicturePak

by Paul Murphy

Last year, a poll on PC MagNet revealed that *PicturePak* clip art was the MagNetters' favorite clip-art package. The *PicturePak* collections range in price from \$79 to \$199 and contain from 80 to 180 images in both .PCX and CGM formats. The same poll also showed that most clip-art users prefer the .PCX format, and our experience with these CGM images only reinforces this point.

CorelDRAW's CGM import filter proved unable to interpret them cor-

FACT FILE

Moonlight Artworks Collection

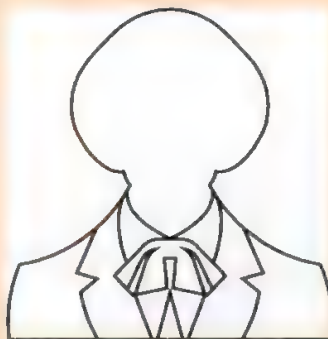
Hired Hand Design,
3608 Faust Ave.,
Long Beach, CA
90808-2842; 213-429-2936.

Formats: EPS

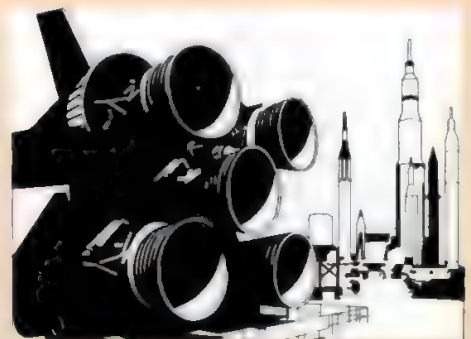
List Price: \$49 per volume; all three volumes, \$99. PC Set 1 (110 images); Holiday PC Set (90 images); Logo Master PC Set (195 images).

In Short: There's a good sampling of images here, most of which can get the job done, but don't expect to find that special image that catches the eye.

IRCLE 605 ON READER SERVICE CARD



Much of *PicturePak's* artwork consists of black-filled silhouettes and simple line drawings. If you want an image of a businessperson, your choices are the back of a man's head or a faceless woman.



Need some graphics?

1990 World Class Award for
Best Mail-Order Company



- 3 1/2" format available from us. Specify when ordering.
 - package includes both 5 1/4" and 3 1/2" disks.
 - 3 1/2" format available from manufacturer by request. Call us for details.
- CP—copy-protected; NCP—not copy-protected.

The four-digit number next to each product is the product's ITEM NUMBER. Please refer to this number when ordering. Thank you.

SOFTWARE

We only carry the latest versions of products. Version numbers in our ads are current at press time. Products listed here in red are Microsoft Windows Applications.

- Adobe Systems ... NCP**
- 7547 □ Adobe Type Mgr. 1.1 for Windows \$65.
 - 9623 □ Adobe TypeAlign 1.0 for Windows 69.
 - 7928 □ Adobe Plus Pack 129.
 - 8367 □ ATM & Plus Pack Bundle 189.
 - 7392 □ Adobe PostScript Cartridge 319.
- (Entire Adobe Type Library, from 1 to 194 is available. Call for more information.)
- Aldus ... NCP**
- 1332 □ PageMaker 4.0 499.
- Alpha Software ... NCP**
- 5104 □ Alpha Four 1.1 319.
- Application Techniques ... NCP**
- 1214 □ Pizazz Plus 2.0 69.
- 9621 □ Picture Eze 1.0 for Windows 99.
- Ashton-Tate ... NCP**
- 4450 □ dBASE IV 1.1 499.
- Asymetrix ... NCP**
- 7384 □ Toolbook 1.0 for Windows 309.



Adobe Systems ... NCP
9623 □ Adobe TypeAlign 1.0 for Windows—Provides customized text-manipulation, compatibility with graphics & drawing applications. Create distorted, perspective & curved type with mixed typefaces, styles & sizes. Requires ATM for Windows \$69.



Microsoft ... NCP
2856 □ Excel 3.0 for Windows—Now the best Windows spreadsheet just got better! New features make it even more powerful and easier to use than ever.

Version 3.0 enhancements include Autosum & Best Fit to make building spreadsheets easier, faster linking of multiple worksheets, solve multiple variable equations for what-if analyses, and run macros easier by creating a button on your worksheet. It also includes a more powerful forecasting feature. Just change a chart point and the underlying worksheet is automatically updated. You can also easily create style templates and add clip art to your spreadsheets.

More powerful graphics, dynamic linking between other Windows programs, and additional help and file compatibility for anyone familiar with Lotus 1-2-3, makes this a must for any serious Windows user. . \$329.

- Atech Software ... NCP**
- 9436 □ Publisher's Powerpak for Windows with Super Font Pack free 49.
- 9435 □ Publisher's Powerpak for WordPerfect & MS Word w/Super Font Pack free 49.
- Avery ... NCP**
- 6006 □ Label Pro 1.0 (Laser) 49.
 - 7336 □ Label Pro 1.0 for Dot Matrix 49.
- Bitstream ... NCP**
- 7568 □ FaceLift 1.0 for Windows 2.x/3.0 59.
 - 8040 □ FaceLift for WordPerfect 5.0/5.1 59.
 - 7569 □ Companion Value Pack 1.0 125.
 - 8883 □ Type City Cartridge with Deli 259.
- Typeface Packages each 89.
- Bloc Publishing ... NCP**
- 1447 □ FormTool Gold 3.0 55.
 - 9039 □ 3-D CHARTS To Go! 1.0 59.
- Borland International ... NCP**
- 6242 □ Quattro Pro 2.0 339.
 - 1514 □ Paradox 3.5 529.
 - 9635 □ Object Vision 1.0 (intro. price) 95.
- Broderbund ... NCP**
- 1416 □ New Print Shop Companion 33.
 - 1434 □ New Print Shop 39.
- Brown-Wagh ... NCP**
- 8579 □ MicroLogic More Fonts 2.0 75.
- ButtonWare ... NCP**
- 6419 □ PC-File 5.01 89.
- Caere ... NCP**
- 6004 □ OmniPage 386 3.0 489.
- Central Point ... NCP**
- 5039 □ PC Tools 7.0 115.
 - 8114 □ Backup 7.0 84.
- Checkfree Corporation ... NCP**
- 6360 □ Checkfree 19.
- Chronologic Corp. ... NCP**
- 8849 □ Instant Recall 1.2 64.
- CompuServe**
- 7546 □ DOS Membership Kit 1.2 23.
- Concentric Data Systems ... NCP**
- 6575 □ R & R Relational Report Writer 4.0 159.
- Corel Systems ... NCP**
- 5506 □ CorelDRAW! 2.0 389.
- Data Storm ... NCP**
- 4798 □ PROCOMM PLUS 2.0 69.
- DCA ... NCP**
- 5611 □ Crosstalk for Windows 1.1 125.
- Delrina Technology ... NCP**
- 4325 □ PerFORM 2.1 95.
 - 7351 □ PerFORMPRO 1.0 for Windows 274.
- Digital Research ... NCP**
- 8288 □ DR DOS 5.0 145.
- DMA ... NCP**
- 8378 □ PC Anywhere IV 4.02 105.
- Fifth Generation Systems ... NCP**
- 7725 □ Direct Access 5.0 65.
 - 3950 □ Fastback Plus 2.1 119.
- FormWorx ... NCP**
- 5810 □ FormWorx with Fill & File 2.5 85.
 - 7311 □ Form Publisher for Windows 1.2 139.
- Fox Software ... NCP**
- 6188 □ FoxPro 1.02 459.
- Funk Software ... NCP**
- 7380 □ P.D. Queue 1.0 (print spooler) 59.
 - 2228 □ Sideways 3.3 59.
 - 9488 □ Sideways & P.D. Queue 85.
- Geoworks ... NCP**
- 8789 □ Ensemble 1.0 129.
- Great American Software ... NCP**
- 4880 □ One Write Plus Acct. Sys. 2.06 189.
- Hayes ... NCP**
- 7983 □ Smartcom Exec 2.0 79.
 - 9639 □ LANstep 1.0 (to be released 4/91) 349.
- hDC Computer Corp. ... NCP**
- 8974 □ Icon Designer 1.0 35.
 - 7389 □ Windows Express 3.0 52.
 - 7383 □ First Apps 1.0 52.



Bitstream ... NCP
Fast and easy to use, FaceLift scales printer fonts to any size. Includes 13 typefaces to give you professional documents instantly.
7568 □ FaceLift 1.0 for Windows 2.x/3.0 \$59.
8040 □ FaceLift for WordPerfect 5.0/5.1 59.

Or spreadsheet magic?



Funk Software ... NCP

9488 ☐ Sideways and P.D. Queue—Two great Lotus add-ins together at one great price. Print great-looking extra-wide spreadsheets and let P.D. Queue get you back to work fast by managing the printing in the background \$85.

Helix Software ... NCP

- 9627 ☐ Netroom 1.1 (single user) 52.
9626 ☐ Netroom 1.1 (4 user) 95.
9628 ☐ Headroom 2.0 65.

Hilgraeve ... NCP

- 2323 ☐ HyperACCESS/5 2.0 (DOS & OS/2) 115.

IBM ... NCP

- 6599 ☐ Current 1.1 239.

Individual Software ... NCP

- 6222 ☐ Resume Maker 1.3 29.

Inner Media, Inc. ... NCP

- 8846 ☐ Wide Angle 1.0 for Windows 69.

Inset Systems ... NCP

- 7298 ☐ HiJaak 2.0 99.

- 7300 ☐ Inset Plus HiJaak 125.

Insight Development ... NCP

- 8320 ☐ PrinTools 1.0 85.

Insight Resource ... NCP

- 8851 ☐ KO-Pilot for WordPerfect 5.1 55.

Intuit ... NCP

- 2426 ☐ Quicken 4.0 39.



Corel Systems ... NCP

5506 ☐ CorelDRAW! 2.0—The PC graphics software that's fast, fun and powerful. CorelDRAW! 2.0 now comes with more drawing power, more type control, and more value...and it's still easy to use \$389.

Isogon ... NCP

- 7478 ☐ FontSpace 2.0 \$59.

LaserGo ... NCP

- 7635 ☐ GoScript Plus 3.0 189.

LaserTools ... NCP

- 6882 ☐ PrintCache 2.3 99.

Lord Publishing ... NCP

- 5191 ☐ Ronstadt's Financials 1.02 75.

Lotus ... NCP

- 5417 ☐ 1-2-3 3.1 429.

- 5653 ☐ 1-2-3 2.2 349.

- 5134 ☐ Magellan 2.0 109.

- 4131 ☐ Agenda 2.0 299.

MECA ... NCP

- 2798 ☐ Managing Your Money 7.0 139.

Micro Logic ... NCP

- 6787 ☐ Info Select 1.1 55.

Microcom ... NCP

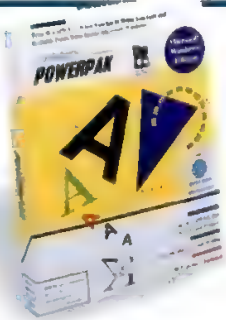
- 7649 ☐ Virex-PC 1.1 79.

- 6234 ☐ CarbonCopy Plus 5.2 119.

Microlytics ... NCP

- 9636 ☐ Strunk & White Elements of Style . 35.

- 7931 ☐ Random House Encyclopedia ... 68.



Atech Software ... NCP

Publisher's Powerpak & Super Font Pack Bundle—A complete font solution. Spruce up your documents with "On-The-Fly" scalable fonts. Awarded PC World's Best Buy (1/91).

9436 ☐ Windows \$49. 9435 ☐ WordPerfect \$49.

Microsoft ... NCP

- 2894 ☐ QuickBasic 4.5 69.

- 7010 ☐ Windows 3.0 99.

- 7388 ☐ Project 1.0 for Windows 459.

- 7882 ☐ Productivity Pack 1.0 for Windows 45.

- 2904 ☐ Works 2.0 99.

- 2901 ☐ Word 5.0 209.

- 7387 ☐ PowerPoint 2.0 for Windows 329.

- 6195 ☐ Word 1.1 for Windows 329.

- 2856 ☐ Excel 3.0 for Windows 329.

- 8137 ☐ Office for Windows (includes Excel, Word for Windows, and PowerPoint) 659.

- 2853 ☐ C Compiler 6.0 329.

1-800/243-8088



PC Connection
6 Mill Street
Marlow, NH 03456

840M

SALES 603/446-7721 FAX 603/446-7791



Central Point Software ... NCP

9751 ☐ Anti-Virus 1.0—Recognizes over 500 known and unknown viruses. Combines virus detection, removal and prevention. Includes a virus hotline, quarterly mailings, on-line support and one free update \$84.

Multisoft ... NCP

- 4925 ☐ PC-Kwik Power Pak 2.0 75.

NBI, Inc. ... NCP

- 9618 ☐ Legacy 1.1 289.

Nolo Press ... NCP

- 5122 ☐ For The Record 2.0 35.

- 2982 ☐ WillMaker 4.0 39.

PC Globe ... NCP

- 5902 ☐ PC Globe 4.0 39.

- 5900 ☐ PC USA 2.0 39.

Peranics ... NCP

- 9288 Laptop Ultravision 1.0 (3½" only) .. 49.

- 4384 ☐ Ultravision 2.0 79.

PowerUp ... NCP

- 7860 ☐ Calendar Creator Plus 4.0 45.

- 7861 ☐ Address Book Plus 3.0 49.

- 7858 ☐ Express Publisher 2.0 89.

Precision Software ... NCP

- 6600 ☐ Superbase 4 for Windows 1.2 .. 429.

Qualitas ... NCP

- 7539 ☐ 386MAX 5.1 75.

- 7967 ☐ BlueMAX 5.1 for PS/2 (3½" only) .. 85.

Quarterdeck ... NCP

- 6422 ☐ QRAM 1.0 54.

- 3221 ☐ Expanded Memory Mgr. 386 5.1 .. 65.

- 3220 ☐ DESQView 2.3 85.

- 4586 ☐ DESQView 386 2.3 145.

QUE Software ... NCP

- 4155 ☐ RightWriter 4.0 54.

Reality Technologies ... NCP

- 7891 ☐ WealthStarter 1.0 39.

- 6572 ☐ WealthBuilder 1.1 145.

Reference Software ... NCP

- 4396 ☐ Grammatik IV 2.0 59.

- 7483 ☐ Grammatik for Windows 2.0 59.

Revolution Software ... NCP

- 4480 ☐ VGA Dimmer 3.0 (screen saver) .. 29.

Roykore ... NCP

- 8162 ☐ ABC Flowcharter 1.1 189.

Samna ... NCP

- 5799 ☐ Ami Pro 1.2 309.

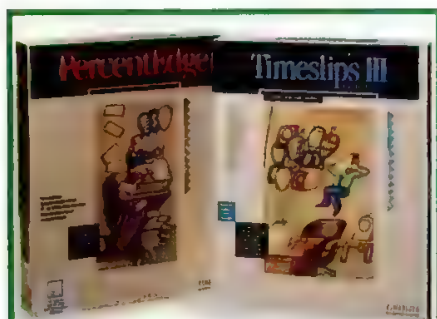
Sitka ... NCP

- 6675 ☐ TOPS Network Bundle 3.0 159.

- 3720 ☐ Flashcard 2.1 (AppleTalk ntwrk. card) 155.

PC CONNECTION®

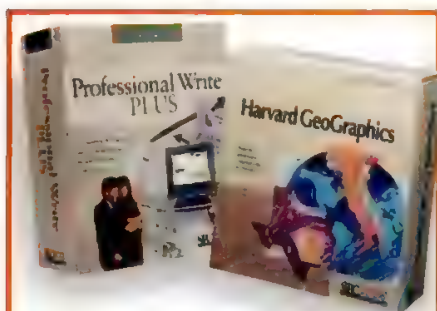
How 'bout a new way



TIMESLIPS ... NCP

2987 ☐ Timeslips III 4.0—Perfect for service professionals (ie. accountants, lawyers, etc.) who need to track & bill their time. . . . \$195.
6994 ☐ PercentEdge 1.0—Calculates mortgages, loans, annuities, present values, & more. . . 69.

- Softlogic Solutions ... NCP**
3542 ☐ Software Carousel 5.0 55.
- Software Publishing ... NCP**
9638 ☐ Professional Write Plus 1.0. 175.
3482 ☐ Harvard Graphics 2.3 329.
9490 ☐ Harvard GeoGraphics 269.
- Solution Systems ... NCP**
7977 ☐ Brief 3.0 (Programmer's Editor) . . 189.
- Spinnaker ... NCP**
3478 ☐ PFS:First Choice 3.1 105.
7604 ☐ PLUS for Windows 1.0 289.
- Symantec ... NCP**
6397 ☐ The Norton Backup 1.2 105.
3146 ☐ The Norton Utilities 5.0 119.
3425 ☐ Q&A 3.0 239.
7999 ☐ Norton Anti-Virus 1.0 89.
- Systems Compatibility ... NCP**
8215 ☐ OutsideIn 1.0 65.
6564 ☐ Software Bridge 5.0 79.
9046 ☐ The Complete Writer's Toolkit 1.0 . 85.
- TIMESLIPS ... NCP**
2987 ☐ Timeslips III 4.0 195.
6994 ☐ PercentEdge 1.0 69.
- Timeworks ... NCP**
6253 ☐ Publish-It! 1.1 139.
- Touchstone Software ... NCP**
7420 ☐ Check It 3.0 89.



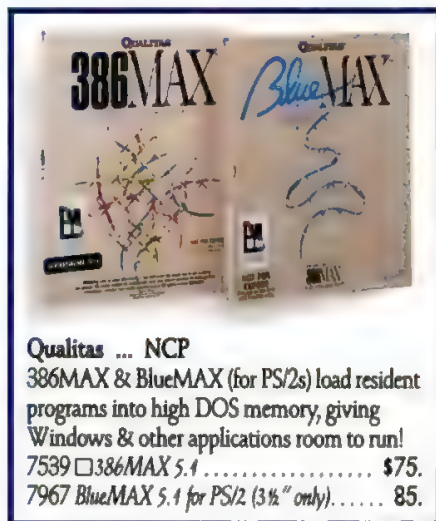
Software Publishing ... NCP

9638 ☐ Professional Write Plus 1.0—Enhanced Windows version of the top-selling executive word processor. \$175.
9490 ☐ Harvard GeoGraphics 1.0—Powerful stand alone mapping program. 269.

- Traveling Software ... NCP**
5179 ☐ LapLink III 3.0 \$95.
- Ventura Software (Xerox) ... NCP**
7796 ☐ Ventura Publisher for Windows 3.0 569.
- West Lake Data Corp. ... NCP**
7577 ☐ PC-FullBak + 2.0 52.
- WordPerfect Corp. ... NCP**
7781 ☐ LetterPerfect 1.0 129.
3804 ☐ WordPerfect 5.1 265.
6685 ☐ DrawPerfect 1.1 279.
- WordStar International ... NCP**
6791 ☐ WordStar Prof. 6.0 219.
- XTREE ... NCP**
6161 ☐ XTree Gold 2.0. 95.

RECREATIONAL/EDUCATIONAL

- Broderbund ... CP**
8068 ☐ Where in the World is Carmen
San Diego Deluxe Edition 52.
5851 ☐ SimCity 33.
8886 ☐ SimEarth 45.
- Electronic Arts ... NCP**
4534 ☐ Mavis Beacon Teaches Typing (CP) 35.
7865 ☐ PGA Golf 39.



Qualitas ... NCP

386MAX & BlueMAX (for PS/2s) load resident programs into high DOS memory, giving Windows & other applications room to run!
7539 ☐ 386MAX 5.1 \$75.
7967 BlueMAX 5.1 for PS/2 (3 1/2" only). . . . 85.

- Harvard Associates ... NCP**
2324 ☐ PC Logo 3.0 59.
- Microsoft ... NCP**
7881 ☐ Entertainment Pk for Windows 1.0 29.
2858 ☐ Flight Simulator 4.0 42.
8270 ☐ Aircraft and Scenery Designer 1.0 29.
- Microsoft Press (Books)**
8129 Running Windows (2nd Edition) . . . 22.
8136 Running Microsoft Excel 22.
- Penton Overseas ... NCP**
☐ VocabuLearn/c Levels I & II (French, Italian, German, Spanish, Russian, Hebrew and Japanese). each 35.
- Sierra ... CP**
8146 ☐ Quest for Glory II 39.
9466 ☐ Space Quest IV (VGA) 39.
7972 ☐ King's Quest V (VGA). 45.
- SirTech. ... CP**
8235 ☐ Bane of the Cosmic Forge 39.
- Software Toolworks ... NCP**
4659 ☐ Chessmaster 2100 (CP) 35.
7372 ☐ World Atlas 42.
- Stone & Assoc. ... NCP**
5231 ☐ Phonics Plus 1.1 22.
7564 ☐ Young Math 2.2 22.



Microlytics ... NCP

Famous reference works come to the PC!
Both are based on the printed versions of their namesakes.

7931 ☐ Random House Encyclopedia. \$68.
9636 ☐ Strunk & White Elements of Style . . . 35.

SubLogic ... NCP

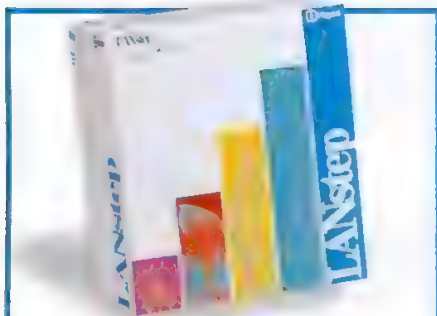
- 6190 ☐ Air Transport Pilot. 39.
- Toyogo ... NCP**
7676 ☐ Nemesis Go Master Deluxe 88.
- True BASIC, Inc. ... NCP**
☐ Kemeny/Kurtz Math Series. each 45.

HARDWARE

Warranties listed next to manufacturer.

- American Power ... 2 years**
7108 Smart UPS 400. 339.
7105 Smart UPS 600LS. 469.
6811 360SX (stand-by power source) . . 219.
7106 520ES (stand-by power source). . . 329.
- AST Research ... 5 years**
1299 SixPakPlus 384k C/S/P 179.
8041 SixPak 286 0k. 99.
- ATI Technologies ... 2 years**
9629 VGA Wonder (256K upgradable to 512K) 199.
9619 8514/Ultra Graphics Card (512K) (req. VGA) 419.
9620 9600etc/e Modem 499.
- Boca Research ... 5 years**
7001 BOCARAM/AT PLUS (0-8 Meg) . . . 119.
7061 BOCARAM/XT OK (0-2 Meg, LIM 4.0) 99.
6998 I/O Board for AT 59.
6999 I/O Board for Microchannel (S/S/P) 109.
8380 BasicVGA (256K, 640 x 480). 69.
8381 SuperVGA (1 Meg, 1024 x 768). . . 145.
- Bravo Communications ... 2 years**
7400 2 Pos. Laser Compatible Switch Box 109.
- Brown-Wagh ... 1 year**
8578 Creative Labs Sound Blaster 159.
- Canon ... 1 year**
7894 BJ-10e Printer w/free case (4.6 lb.) 349.
7897 BubbleJet Ink Cartridge (BJ-10e) . . 23.
9037 BJ-300 Printer (80 column). 549.
9038 BJ-330 Printer (136 column). . . . 649.
- CH Products ... 1 year**
8119 FlightStick w/Falcon & GameCard III 79.
7345 RollerMouse (Trackball) serial 85, bus 99.
- Curtis ... lifetime**
1708 Ruby-Plus SPF-2 Plus 65.
7358 Command Center. 89.
- Glass Filter Plus (specify size) each 65.**
- Datadesk ... 3 years**
6901 Switchboard 175.

to print or fax it?



Hayes ... 2 years

9639 LANstep 1.0—Package includes LANstep Mail, a full featured E-mail system, and supports up to five simultaneous users. LANstep networks can grow to 128 users with LANstep Expander products (sold separately) ... \$349.

Epson ... 2 years

We are an authorized Epson Service Center.

- 1906 FX-850 (80 col., 264 cps, 9 pin) ... call
- 1904 FX-1050 (136 col., 264 cps, 9 pin) ... call
- 5183 LQ-510 (80 col., 180 cps, 24 pin) ... call
- 1930 LQ-850 (80 col., 264 cps, 24 pin) ... call
- 1917 LQ-1050 (136 col., 264 cps, 24 pin) call
- 5184 LX-810 (80 col., 180 cps, 9 pin) ... 185.

Hauptpage Computer ... 1 year

- 9031 20 MHz 386 Motherboard for PC . 995.
- 9032 20 MHz 386 Motherboard for XT. . 995.
- 9033 20 MHz 386 Motherboard for AT. . 995.
- 9034 33 MHz 386 Motherboard for AT. . 1399.

Hayes ... 2 years

- 2307 Smartmodem 2400. 349.
- 7391 Ultra 96 Modem 799.

Hewlett-Packard ... 1 year

- 7976 DeskJet 500 (with ink cartridge) . . 549.
- 6582 LaserJet IIP (with toner). 949.
- 6754 LaserJet III (with toner) 1699.

Intel ... 5 years

- 6421 2400B MNP Internal Modem 199.
- 4696 2400B Internal Modem 149.
- 5119 2400 Baud External Modem 179.
- 6420 2400EX MNP Modem. 229.
- 7880 9600EX Modem 549.
- 2346 Inboard 386/PC with 1 Meg 495.
- 5336 Above Board Plus 8 2 Meg 549.
- 5342 Above Board Plus 8 I/O 2 Meg . . 569.
- 7782 SatisFAXtion (fax board) 399.
- 8778 SatisFAXtion for Microchannel . . 449.
- 8901 Matched Memory 2 Meg (PS/2) . . 189.
- 8903 Matched Memory 4 Meg (PS/2) . . 499.

MATH COPROCESSORS

- 7385 80287XL (16 MHz 80286 CPU's) . . 199.
- 4750 80387SX (16 MHz 80386SX CPU's) 309.
- 2371 80387 (16 MHz 80386 CPU's) . . . 349.
- 2372 80387-20 (20 MHz 80386 CPU's) . . 399.
- 4121 80387-25 (25 MHz 80386 CPU's) . . 499.

Kensington Microware ... 1 year

- 2582 Master Piece Plus 109.
- 7899 Expert Mouse serial 119. 7900 bus 129.

Keytronic ... 3 years

- 4518 101 Plus Keyboard 99.

Kraft ... 5 years

- 5800 3 button Thunder Joystick. \$29.
- 5813 Game Card/Thunderstick Bundle . . 55.
- 7862 TopTrak (Laptop Trackball). 75.

Logitech ... limited lifetime

- 7768 C9 Mouse with Windows. 149.
- 6029 Trackman serial . 85. 6028 bus . 89.
- 4297 ScanMan Plus (hand scanner) . . 165.
- 7975 ScanMan 256 319.
- 8694 MouseMan (serial) 69.

Micron Technology ... 2 years

- 7595 2 Meg Expansion for HP LaserJet IIP or III 129.
- 7012 Memory Upgrade PS/2 70 - 2 Meg 149.

Microsoft ... lifetime

- 7597 Microsoft Mouse 89.
- 2897 Mouse with Paintbrush 105.
- 2898 Mouse with Windows 3.0 149.

Microware ... 1 year

- PC-TRAC Trackball serial. 75. 6008 bus. 89.
- 7271 Inport 79. 6330 PS/2. 79.



Intel ... 5 years

7880 9600EX Modem—Provides ultra-fast data communications without sacrificing compatibility. Supports V.32 & V.42bis 9600 bps operation, as well as MNP Level/5 and Hayes compatible 2400/1200/300 bps modes. \$549.

Mouse Systems ... lifetime

- 5997 Trackball (1 yr. wrnty.) serial 65. bus 69.
- 7878 PC Mouse III (bus or serial) 89.

NEC ... 2 years

- 4799 Multisync 2A (VGA Monitor) 499.
- 5085 Multisync 3D Monitor 689.

Orchid Technologies ... 4 years

- 7863 ProDesigner VGA II with 1 Meg. . . 329.

PC Power & Cooling ... 1 year

REPLACEMENT POWER SUPPLIES

- 3203 Turbo Cool 200 149.
- 7915 Turbo Cool 300 165.
- 3200 Silencer 150 (84% noise reduction) 115.
- 7053 InnerSource 2210 349.

1-800/243-8088



PC Connection
6 Mill Street
Marlow, NH 03456

840M

SALES 603/446-7721 FAX 603/446-7791

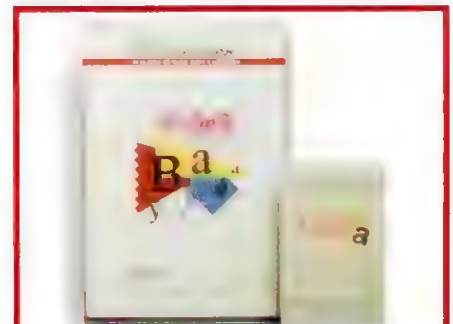


ATI Technologies ... 2 years

9619 8514 Ultra Graphics Card—Up to 10 times faster than IBM's 8514/A, transforms computer into a powerful graphics workstation. Features a dual connector design allowing use in any 16-bit ISA or MCA slot with 512K. \$419.

Pacific Data Products ... lifetime

- 6779 25 Cartridges in One! (for LJ II, IIP, III) 275.
- 8816 PacificType (40 PostScript Typefaces for PacificPage PE 4.0 users). 275.
- 8975 Complete Font Library (for LJ/III) . . 275.
- Memory upgrade for LaserJet IIP/III: 7055 2 Meg . . 169. 7759 4 Meg . . 279.
- Memory upgrade for LaserJet II/IIID: 6838 2 Meg . . 249. 6836 4 Meg . . 379.
- 7158 PacificPage PE 4.0 (for LJ IIP/III) . . 379.
- 6834 PacificPage with free 2 Meg Memory Board (for LaserJet II) . . 379.
- Practical Peripherals ... 5 years**
- 3100 1200 Baud External Modem 75.
- 3103 2400 Baud Internal Modem 129.
- 3102 2400 Baud External Modem 179.
- 8993 2400 Baud Int. Modem (V.42 bis) . . 169.
- 8994 2400 Baud Ext. Modem (V.42 bis) . . 209.
- 4542 2400 Baud Internal Modem for PS/2 229.
- 8132 PM2400 Pocket Modem 109.
- 7934 PM9600SA Modem 489.



Pacific Data Products ... lifetime

8975 Complete Font Library—Provides 51 popular typestyles that can be quickly scaled by the HP LaserJet III and IIID for beautiful resolution-enhanced documents. \$275.

PC CONNECTION®

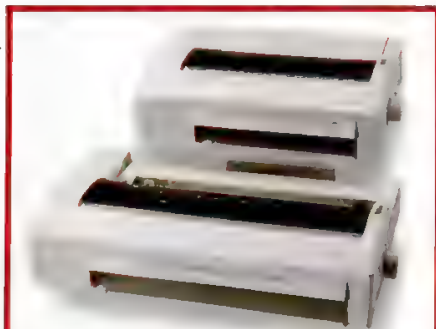
© COPYRIGHT PC CONNECTION, INC. 1991 PC CONNECTION, PCVY AND THE RACCOON CHARACTER(S) ARE REGISTERED TRADEMARKS OF PC CONNECTION, INC. MARLOW, NH. ALL OTHER TRADEMARKS REMAIN THE PROPERTY OF THEIR RESPECTIVE COMPANIES.

Call. We'll pack it.

Reflection Technology ... 1 year	
7127 Private Eye (virtual display)	\$499.
SAFE Power Systems ... 2 years	
6747 Safe 400S	399.
Targus ... lifetime	
6037 Premier Leather Carrying Case	199.
TheComplete PC ... 2 years	
8082 TheComplete Half Page Scanner/400 w/ReadRight Personal OCR Software	289.
6797 TheComplete Fax Portable	319.
5828 TheComplete Communicator	449.
Tripp Lite ... 2 years	
6199 Isobar 4-6 (4 outlets, 6 ft. cord)	49.
6200 Isobar 6-6 (6 outlets, 6 ft. cord)	59.
9193 BC350 (350W Battery Backup)	219.
9312 BC450 (450W Battery Backup)	269.
7889 BC1200 (1200W LAN Backup)	669.
Video 7 ... 7 years	
5883 1024i VGA (includes 512k)	199.
4931 VRAM II VGA 512k	369.

DRIVES

CD Technology ... 1 year	
8057 Porta-Drive CD-ROM	649.
8105 Installation Kit for Standard Bus	95.
8106 Installation Kit for Microchannel	249.



Canon ... 1 year

These ultra quiet BubbleJet printers offer dazzling print quality to rival lasers at dot-matrix style prices. Advanced paper handling capabilities.

9037 BJ-300 Printer (80 column)	\$549.
9038 BJ-330 Printer (136 column)	649.

Conner Peripherals ... 1 year

8875 CP3044 40 Meg IDE HD (25 ms)	325.
8874 CP3184 80 Meg IDE HD (25 ms)	499.
8876 CP3104 100 Meg IDE HD (25 ms)	549.

IOmega ... 1 year

5116 Bernoulli II 44 Meg Internal	829.
7551 Bernoulli II Transportable 44 Meg	929.
5113 44 Meg Cartridge Tripack (5 1/4")	269.
2500 PC2B Controller	209.

Mountain Computer ... 2 years

2917 40-60 Meg Internal Tape Drive	259.
5500 83-152M Int. Tape Drive	629.
5190 DC2000 Pre-formatted Cartridges ea.	35.
6153 DC2120 Tape Cartridge (5 pack)	149.

Pacific Rim ... 1 year

5010 1.2 Meg External (for PS/2's)	215.
6602 1.44 Meg External (for PC/XT/AT)	239.

Plus Development ... 2 years

8304 Hardcard II XL 50 Meg (9 ms)	399.
8287 Hardcard II XL 105 Meg (9 ms)	689.

Seagate ... 1 year

2286 30 Meg Int. Hard Drive ST238R (w/controller and cables, 65 ms)	269.
---	------

4554 40 Meg Int. HD ST251-1 (28 ms)	\$269.
4624 80 Meg Int. HD 4096 (28 ms)	619.
TEAC ... 1 year	
4670 1.44 Meg Drive for PC/XT (3 1/2")	79.
4326 1.44 Meg Drive for AT (3 1/2") with Bastech software	99.
4951 720k Drive for PC/XT (3 1/2")	69.
6951 1.2 Meg Drive for AT (5 1/4")	89.

DISKS/MEDIA

Maxell ... lifetime

2789 5 1/4" MD2-D 360k Disks (Qty. 10)	10.
2792 3 1/2" DS/DD 720k Diskettes (Qty. 10)	13.
2793 3 1/2" DS/HD 1.44Mb Diskettes (Qty. 10)	21.



Plus Development ... 2 years

8304 Hardcard II XL 50 Meg (9 ms)—Durable hard drive with 50 MB of storage with 9 ms effective access time and a 64K on-board cache all installed in one 16-bit slot \$399.



Insight Development ... NCP

8320 PrintTools 1.0—Utilities for the HP LaserJet, DeskJet & compatibles. Includes Spooler, Screen Dump, Screen Capture, SetUp, Plot with HPGL/2 support, and Help utilities \$85.

Sony ... lifetime

3291 5 1/4" DS/DD 360k Disks (Qty. 10)	9.
3297 3 1/2" DS/DD 720k Diskettes (Qty. 10)	12.
3298 3 1/2" DS/HD 1.44Mb Diskettes (Qty. 10)	19.
6148 3 1/2" DS/DD (3 Pack)	29.
6375 3 1/2" DS/HD (3 Pack)	49.
8185 QD 2040 Tape Cartridge	19.

3M ... lifetime

3943 DC 2000 Tape Cartridge	20.
6065 DC 2080 Tape Cartridge	25.
3944 DC 600 Tape Cartridge	29.
5679 DC 6150 Tape Cartridge	29.

MEMORY

6556 256k DRAM (100 ns, set of 9)	call
5510 1 Meg x 9 SIMMs (80 nanosecond)	call
5746 1 Meg Chips (80 ns, set of 9)	call
7813 256k x 4 Chips	call

OUR POLICY

- We accept VISA and MASTERCARD only.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax, except Ohio residents (please add applicable tax).
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped 1st Class Mail.
- International orders U.S. \$250 minimum.
- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order.
- COD max. \$1000. Cash, cashier's check, or money order.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice.
- To order, call us Monday through Friday 8:00 AM to 1:00 AM, or Saturday 9:00 AM to 5:30 PM. You can call our business offices at 603/446-3383 Monday through Friday 9:00 AM to 5:30 PM.



Practical Peripherals ... 5 years

7934 PM9600SA Modem—Practical Peripherals does it again by making communications affordable with their newest modem featuring the data compression & error correction of 9600bps V.32 & V.42bis operation \$489.

SHIPPING

Note: Accounts on net terms pay actual shipping.

Continental US:

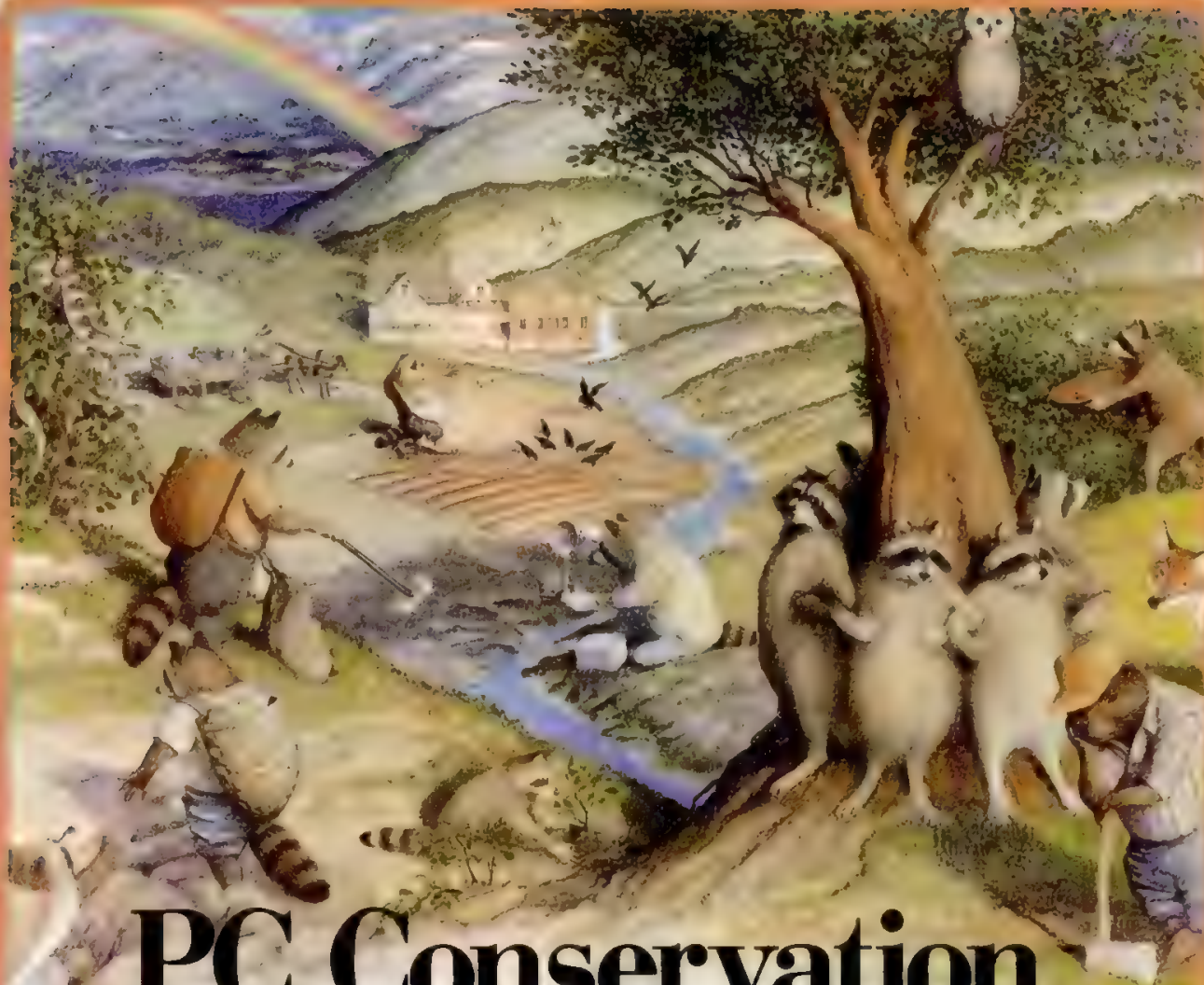
- For heavy hardware items such as printers, monitors, Bernoulli Boxes, etc. pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
- For all other items, add \$3 per order to cover UPS Shipping. For such items, we automatically use Airborne Express at no extra charge if you are more than 2 days from us by UPS ground.

Hawaii:

- For monitors, printers, Bernoulli Boxes, computers, hard drives, and power backups, actual UPS Blue charge will be added. For all other items, add \$3 per order.

Alaska and outside Continental US:

- Call 603/446-7721 for information.



PC Conservation.

Our favorite multiuser environment. (Or, the greening of Big Blue.)

It's only natural that you'd find some serious environmental awareness here in the pristine preserve of Marlow, NH (pop. 565). After all, we have some pretty nice environment to be aware of. In fact, 90% of Marlow is undeveloped forest and wetlands. And our headquarters are on the banks of the Ashuelot River, a popular white-water rafting stream. So we're making sure our act is as clean as it can be.

For example, we now recycle all our used four-color magazines and catalogs. They are beaten to a pulp and transformed into 100% recycled paper right here in New Hampshire.

We, in turn, use this very same paper as a packing material *instead of those annoying foam peanuts*. Overall, we've cut our waste by over 75% in just one year. And, inspired by our down-to-earth mascots, we continue looking for ways to do more (with less), and encourage our vendors to do the same.

The Four Rs: Reduce, Re-use, Recycle, Raccoon.

You'll find it easy to stow it, not throw it when carrying your very own PC Connection insulated lunch bag and re-usable string shopping bag. You won't ever want to leave home without them. They're both free when you place an order of \$750 or more between now and June 30.



Save paper by packing it in PC Connection lunch and shopping bags! One per customer.

PC CONNECTION



FACT FILE

PicturePak

Islandview MGI,
6502 Dickens Pl.,
Richmond, VA
23230; 800-368-
3773, 804-673-5601.

Formats: CGM

List Price: Eye Opener Series (three volumes, 180 images each); \$99 per volume or \$199 for all three volumes (Sales and Marketing, Finance and Administration, Executive and Management). USA Series (three volumes, 180 images each); \$99 per volume or \$199 for all three volumes (State and Local Government, Federal Government, U.S. Maps and Landmarks). Holiday Clips, Technology Clips, World Clips, Military Clips (80 images each), \$79.95 each. PagePak (77 page designs), \$99.

In Short: Choose *PicturePak* only if you have a real need for CGM images. With this collection, you get all the difficulties inherent in the format coupled with some less-than-stellar artwork.



CIRCLE 806 ON READER SERVICE CARD

rectly, causing images to appear at twice the desired size, and with line widths roughly five times the desired thickness. More seriously, every object in the CGM file was interpreted as two objects: an open object that represented the "edge" and a closed object that represented the "fill." This can be corrected only by deleting the open edge and adding an edge to the closed object—a difficult and inconvenient process that made any attempt to edit these images an exercise in futility. These problems are representative of what you'll encounter with CGM-format art, so you should think twice before investing in it if you're serious about editing it.

It's easy to fault the *PicturePak* images for other, more obvious reasons. Artwork seems equally divided between black-filled silhouettes and unfilled wireframe renderings that are neither detailed nor attractive. For example, if you want an image of a businessperson, you'll have to choose between the back of a man's head and a faceless woman—hardly images that will enhance a business presentation.

GENERAL SELECTION

PicturePak images are divided into several series, with each series broken down into several packages that can be purchased at special pricing. These packages, however, seem too general in scope. The Eye Openers series, for example, contains images targeted for business users, but the individual packages (Finance and Admini-

GRAPHICS VECTOR CLIP ART

stration, Sales and Marketing, and Executive and Management) contain images that are too general to be forced into these classes. Other packages contain holiday images and images suitable for page design.

Each package comes with a spiral-bound directory that contains a thumbnail of the image, its filename, and a text description. Images, however, are grouped in alphanumeric order using their non-logical filenames as a reference. To make matters worse, there's no index to help you find the images by description. You'll have to thumb through the directory to find an image. There are references on the disks to aid in file location, however.

If you have a particular need for CGM images, *PicturePak* is worth considering. In general, though, you'd do better to wait until CGM becomes a more dependable format for clip art.

NEW VISION TECHNOLOGIES INC.

Presentation Task Force

by Kellyn S. Betts

If you're a traditionalist, you'll love *Presentation Task Force* for supplying a huge collection of colored, sometimes comical, but never-too-creative kitsch. Like the clipable images found in the books of old, this is a voluminous collection of staid stock art. New Vision Technologies' clip art is quite a bargain on a per-image basis:

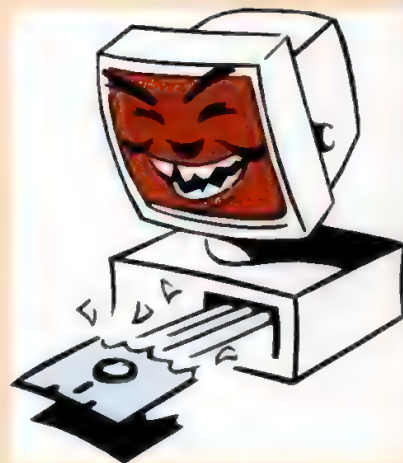
more than 650 colored pictures and about 450 selected black-and-white duplicates add up to 1,100-plus CGM images for only \$199. An older library in *Freelance Plus's* .DRW format is also available.

The collection's 100-plus human and people pieces reflect its emphasis on traditional business presenters, as well as on health care and military audiences. All colors and ages, and both sexes are represented in a wide variety of settings including hospitals, laboratories, construction sites, classrooms, battlefields, and the stereotypical office. The selection of symbols includes props that neatly match these people and places. Additionally, there are flags and maps, as well as symbols associated with almost every major occupation.

COMMENDABLE CARTOONS

The most engaging part of this collection is the 75-image cartoon grouping. Though frequently silly, figures such as the demonic disk eater or the man chasing rainbows with a butterfly net might nonetheless prove memorable—the first time they're used, at least.

Most of these opaque images are crammed into surprisingly small files of less than 5K, and the entire set of images takes up a relatively small 3.6MB. The filing system organizing this set into subdirectories makes it easy to use even from a floppy disk. Unlike its *Freelance*-only predecessor, this version of *Presentation Task Force* features logical naming conventions. The catalog is an integral part of the manual that identifies each image adequately.



Some of the most engaging images in the *Presentation Task Force* library are from the cartoon grouping. But images like the disk-eating drive or the man with a butterfly net are so distinctive that you may be able to use them only once.

Using Windows? use PictureEze™

The Graphics File Converter

With PictureEze you can load a graphic image from any popular bit image file. And you can convert the image into the file format you need to use it with your application. PictureEze offers you easy access to more graphic images. And with PictureEze it's easy to make all your graphic images compatible.

It's Compatible With the Software You Use

PictureEze supports more than 50 of the best-selling applications including all the popular Word Processors, Desktop Publishers, Paint and Draw programs. When you use PictureEze you don't need to search through the manuals to find out which file format your application requires. Just click on the name of your application and PictureEze will convert the file for you automatically. Of course, if you want to specify a particular file format in detail, PictureEze allows you to do that too. It's powerful and flexible, but easy to use.

Use PictureEze to Enhance the Image

With PictureEze you can rotate, mirror, or flip the image. Adjust the color, brightness, and contrast. Crop the image or change its size. Stretch it or shrink it. Reverse the color to produce a negative. Reduce the color content to transform a color image into a high-quality gray-scale image. PictureEze gives you control, and makes image enhancement easy.

**For graphics, use your imagination.
For your image, use PictureEze.**

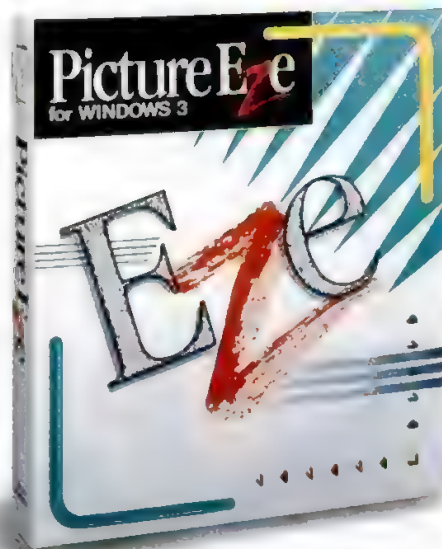
Only \$149.00

plus \$5.00 shipping and handling
requires Microsoft Windows 3



Application Techniques, Inc.
10 Lomar Park Drive, Pepperell, MA 01463

CIRCLE 330 ON READER SERVICE CARD



**ORDER TOLL FREE
(800) 433-5201**

in MA (508) 433-5201 FAX (508) 433-8466



FACT FILE

Presentation Task Force

New Vision Technologies Inc.,
38 Auriga Drive,
#13, Nepean,
Ontario K2E 8A5 Canada; 613-727-8190.

Formats: CGM, Freelance (.DRW)

List Price: \$199 (1,100 images).

In Short: This collection gives you a vast array of business images at an average of 18 cents each, but the CGM format means they're not well-suited to editing.



CIRCLE 667 ON READER SERVICE CARD

GRAPHICS VECTOR CLIP ART

mally colored ones can map to gray scale (sometimes with a bit of help).

Ultimately, you get what you pay for. This collection gives you a huge variety of general business images for an average of 18 cents each. It's a strong choice if you have software with limited color capabilities and want to plug and play.

MULTI-AD SERVICES

ProArt Professional Art Library

by Rob Smith

Sometimes you need a detailed image, and sometimes just a symbol will do. In a collection of 12 clip-art libraries containing both simple and sophisticated images, *ProArt Professional Art Library* gives you that choice.

These 12 libraries, which currently compose *ProArt's* ever-expanding product line, consist of Business, Education, Religious Images, Holidays, Christmas, Sports, People, Generic Products, Borders and Headings, Medical, Food, and Animals. Each library contains approximately 100 images and retails for \$139; \$375 for a group of three. The various collections are available on CD-ROM.

Each collection has its own well-organized visual index that uses logical filenames to make it easy to find the image you need. The specific categories are well thought out and add to the ease of movement. *ProArt* also includes helpful



FACT FILE

ProArt Professional Art Library

Multi-Ad Services,
1720 W. Detweiler
Dr., Peoria, IL
61615; 309-682-1530.

Formats: EPS

List Price: \$139 per volume (100 images each); CD-ROM with 3 volumes, \$375.

Volumes: Business, Generic Products, Education, People, Holidays, Food, Sports, Religious Images, Christmas Collection, Borders and Headings, Animals, Health and Medical.

In Short: Whether you need a detailed image or a simple graphic symbol, *ProArt* can meet your needs. And while the volumes may not offer a wide variety of images, the images themselves are easy to work with.



CIRCLE 668 ON READER SERVICE CARD

ly, though nothing is shown in color.

In truth, there's not a lot of color to show, as it's used sparingly throughout the collection. The indexed palette contains but 12 colors, and a good percentage of the images uses less than half that number. The manual describes how to make these colors mesh with those displayed by many popular presentation graphics programs, and the colors automatically map to *Windows* palettes.

LESS THAN ENVIABLE EDITING

Although it's easy to reassign a color, editing images is another story. These images, made up entirely of curves because of the limitations imposed by the CGM standard, are always saved as one group of objects—and the group is not always logically composed. You may want to enhance the images in this set since many appear simple, outdated, or not particularly true to the world they represent.

The yellow map of Europe is a perfect example: It shows West but not East Germany, and there's a strange cove-like indentation where Switzerland and Austria should be. While the missing countries could be added, any attempts to re-color the rendering to make its boundary lines more obvious or to demarcate each country for separate coloring would require a great deal of breaking, copying, and joining.

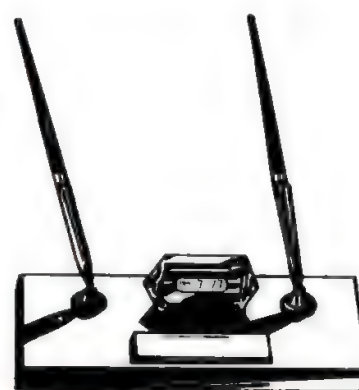
According to New Vision, these images were not designed to be enhanced. The company claims that the restricted color palette ensures that the images will be compatible with the greatest number of software packages, while the use of simple components ensures that they'll rotate well. The images print well enough. The black-and-white images offer no shades of gray, but the mini-

tips on customizing images with various graphics packages.

Specific categories don't always offer many variations of a given image, however. For example, the Generic Products collection has a wide variety of different appliances, but there's only one image of each. The images are well-drawn, though, so you may not miss the lack of variety.

FROM SIMPLE TO SOPHISTICATED

Although there isn't always a wide variety of images, quality and usability are emphasized. Many of the black-and-white images make great use of the EPS format with perspective and shading, while others promote absolute simplicity in silhouette. The images are constructed logically for the most part, with enough nodes to make editing easy. In some cases, there



The *ProArt Professional Art Library* offers both detailed images that use shading and perspective and more simple, symbol-like images. There are a substantial number of subject-specific collections, but they don't always offer a wide variety of images.

are more nodes than you really need. For instance, in one image, a businessman's pair of pants has many thin stripes, each of which can be edited (though it's unlikely that you'll do so). On the downside, the United States map is a disappointment. It uses an open path construction, so you can't break apart individual states or highlight specific regions. This type of image is more the exception than the rule, though. Image quality is not lost in printing, either.

ProArt and its expanding library offer a good selection of images in styles ranging from symbols to sophisticated drawings. So whether you need a detailed image for a display ad or a tight graphics symbol, *ProArt* can meet your needs admirably.

TOTEM GRAPHICS

Totem Color Clip Art

by Luisa Simone

If you're a sucker for a pretty face, or a pretty fish, or a pretty bird, *Totem Color Clip Art* is the product for you. At \$125 per volume or \$1,120 for the entire set on CD-ROM, each of the 13 volumes currently available gives you 96 images on one subject, such as flowers, tools, or women. While these pictures aren't specifically business-oriented, you can dramatically increase the aesthetic value of any presentation if you're flexible.

Each of the files, in either EPS or *CorelDRAW* format, contains a single image. Totem's startlingly realistic pic-

GRAPHICS VECTOR CLIP ART

tures prove that vector drawings aren't necessarily simple; subtle color shadings and painstaking detail dramatically increase their complexity. Moreover, Totem's images contain many gradient fills, which for compatibility reasons must be simulated with concentrically arranged objects. The effect is beautiful, but a tremendous drain on system resources.

A file with hundreds of objects slows down display and printing times to a snail's crawl. And even Totem Graphics admits that including too many images in a single page can actually cause a PostScript interpreter to bomb out. One image, an American Express Card that contained 939 objects with 4,027 nodes, took about two minutes to load into *CorelDRAW*.

A LOT OF DETAIL GOES TOO FAR

You will never need to edit these images to add complexity, but you may find that you need to delete detail. The fine detail tends to plug up when you reduce an image by more than 50 or 60 percent. And the easiest way to reduce the memory requirements is to delete the multiple objects that simulate gradient fills.

However, you start hitting serious snags when you ungroup an imported image. Several of the images we tested contained all the elements of the drawing in one group—an image-management nightmare. Ungrouping a drawing of a woman, for example, created 371 objects



FACT FILE

Totem Color Clip Art

Totem Graphics,
5109-A Capital
Blvd., Tumwater,
WA 98501; 206-352-1851.

Formats: EPS, *CorelDRAW* (.CDR)

List Price: \$125 per volume (96 images each). All 13 subjects on CD-ROM, \$1,120. Volumes: Birds, Domestic Animals, Fish, Flowers, Food, Holidays, Insects, Nautical, Sports, Tools and Hardware, Wild Animals, Women, Deluxe Business 1 and 2.

In Short: For sheer artistry, nothing tops *Totem Color Clip Art*. Its color images are meticulously rendered, but each image has so many objects that they're almost impossible to modify.

CIRCLE 609 ON READER SERVICE CARD



to be individually managed. As a result, even simple changes—like modifying the color of the blouse—were time-consuming.

Like the pictures themselves, the Totem Graphics manual is in full color. The looseleaf binder allows you to add sections as you purchase each volume. The index in the front of each section directs you to the proper diskette and lists the DOS filename for each image. Unfortunately, the manual discusses the intricacies of color reproduction and image modification only briefly. For example, it tells you that the color images will print just fine on a monochrome laser printer but omits the reason: They do so because the designers have tried to use colors that differ both in value and hue.

Two new volumes, *Deluxe Business Images 1 and 2*, which should be available by the time you read this article, will contain a wider array of business-oriented images. Though you will find renderings of computers in the business collections, don't expect lots of high tech hardware. The designers at Totem are more than capable of producing quality renderings of equipment (even a simple microfloppy contains a gradient metallic highlight and visually interesting color details), but there is a much higher proportion of people-oriented pictures.

Even with all of the caveats—the editing difficulties and the slow performance times—we would still recommend *Totem Color Clip Art*. If you need the very best in quality, the technical difficulties associated with complex vector art don't outweigh the artistic value of this library of images. ■



Each of the 12 volumes of *Totem Color Clip Art* gives you 96 beautiful images on one subject, but many of these images are exceedingly complex. As a result, even simple changes, like recoloring part of an image, can be time-consuming.



Our Award-W And The Pow



inning 386sx. er Behind It.

NCR System 3000. The First PC Family That Doesn't Stop With PCs.

PC Magazine named the NCR System 3320 their Editor's Choice as the top-performing 20MHz 386sx PC.

They said "This latest 20MHz 386sx places the corporation at the forefront of technology...its performance marks it as one of NCR's best machines to date." And *Byte* called it "very impressive."

Compared to other Micro Channel™ PCs, the 3320 offers superior price/performance and faster memory architecture. It has SuperVGA and a SCSI controller for enhanced I/O built onto the processor board. And it can be upgraded to the more powerful i486* processor quickly and easily.



Those features alone would make the 3320 the best buy in its class. But what's behind the 3320 is even more impressive than what's inside it.

What's behind it is the world's most complete, end-to-end computer line—the NCR System 3000 family. An open, scalable family based on the powerful Intel® x86 chipset series. From portables to desktops to servers to future massively parallel systems that will reach performance levels of more than 100,000 MIPS, the System 3000 gives you the widest range of open computing options in the industry.



The System 3000 offers total scalability of hardware *and* software, and complete object code compatibility, to give you access to an enormous application software suite. Start with the System 3320, and there's no limit to your growth.

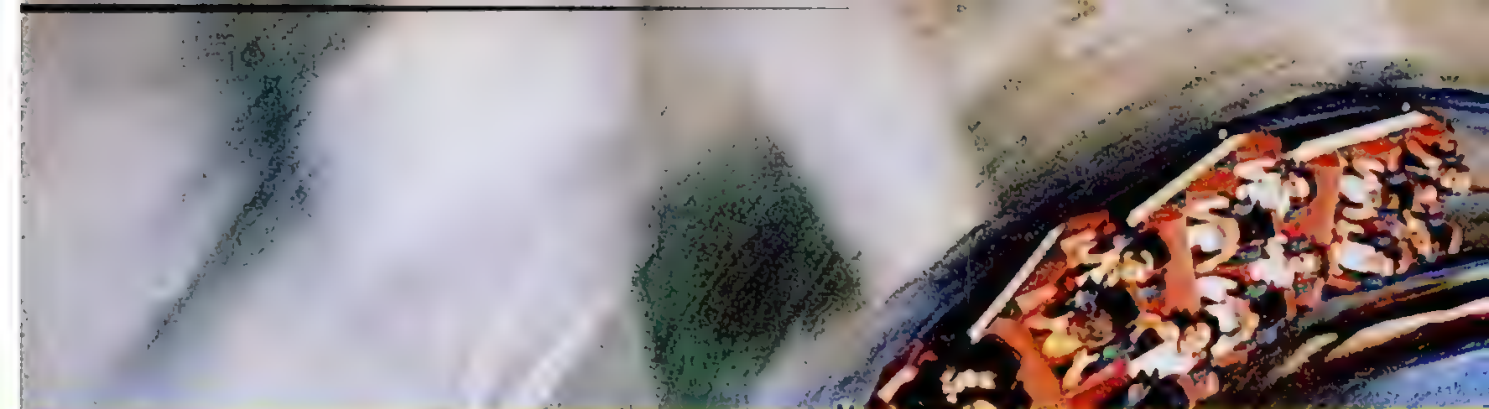
The System 3000 is designed to connect to your current computing environment. So customers with large investments in proprietary systems can preserve that investment, while moving toward a more flexible, open environment.

For more information on the NCR System 3320 and the rest of the System 3000 family, phone 1-800-CALL NCR. You'll find that our award-winning 386sx is the start of something big.

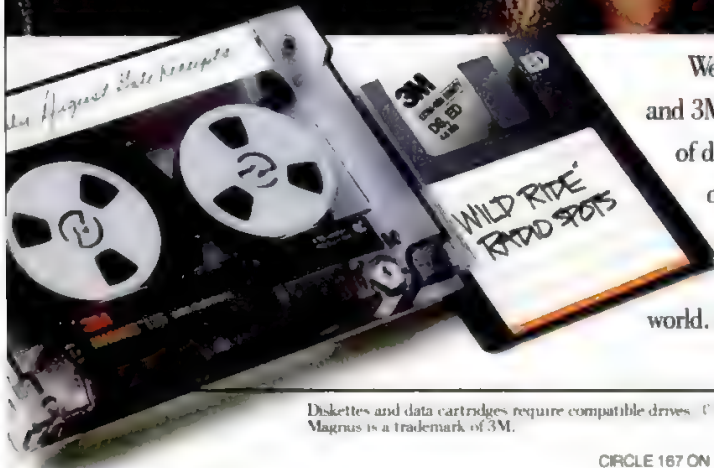


Open, Cooperative Computing.
The Strategy For Managing Change.

*Source: PC Magazine, November 27, 1990. **Source: Byte, May 1990.NCR is the name and mark of NCR Corporation. Intel and i486 are registered trademarks of Intel Corporation. Micro Channel is a trademark of IBM. © 1991 NCR CorporationCIRCLE 242 ON READER SERVICE CARD



Your business is safe with us.
Through all of its ups and downs.



We'll help you keep your business rolling. With our 4 megabyte diskettes and 3M Magnus™ 1.35 data cartridges you have a whole new generation of data storage media for high capacity systems. So, whatever format or capacity your data is stored in, we're ready when you are.

That's why more business protects important information on 3M brand diskettes and data cartridges than any other brand in the world. Call 1-800-888-1889 ext.4 to find out more.

Innovation working for you™

Diskettes and data cartridges require compatible drives. © 3M 1991
Magnus is a trademark of 3M.

CIRCLE 167 ON READER SERVICE CARD

3M | 
Worldwide Sponsor 1992 Olympic Games
36USC380



Slide Services

by Kellyn S. Betts

Color slides and transparencies are the best way to present your graphics to an audience. And getting slides is easier than ever, thanks to slide service bureaus that will image them directly from your PC graphics files.

It's easy to become addicted to slides if you're paid to be a communicator. And thanks to the nationwide proliferation of slide service bureaus, turning your presentation graphics files into 35-mm. film is not much more difficult than printing them on a laser printer. In simplest terms, all you have to do is to zip off your completed graphics files for processing; your slides show up in a day or two, mounted and ready to use. What a contrast to the old method of hiring an artist to create graphics from a script!

Slide making has become so much simpler largely because the software vendors and the slide services have started working together. Most major graphics packages now include the drivers and communications utilities you need to send your files directly to a service bureau. Insert cards tell you everything you need to know to get started, and you can enter all the necessary order information right in the software for automated processing. These service inno-

vations make it easy to get good-looking slides with little fuss.

These services do cost money, of course. For one-day turnaround on slides (to which you must add the time it takes to ship the completed slides to you), these services charge anywhere from \$9 to \$18 per slide, plus shipping fees that are usually about \$20 per shipment. For this reason,

many experienced presenters prefer to use one of the 4,000 local services competing for your slide dollar (see the sidebar "Stalking the Regional Jungle"). Unlike the national bureaus, these can cost as little as \$5 per slide for overnight service. And because these companies are based locally, shipment takes less time, letting you shave deadlines more closely. But since these local bureaus don't have the benefit of custom drivers and service links, they

STALKING THE REGIONAL JUNGLE

by Kellyn S. Betts

If you're interested in cutting your slide processing costs, consider looking for a local service bureau in your area. Local services generally charge less for processing than do national bureaus and can save you money on toll calls and courier's fees. But there's a huge amount of variability in terms of what the services offer and how well their staff produces it, as we learned when we tested a sampling of bureaus in New York City. Darwin would have been impressed with the diversity of adaptations that these organizations exhibit. The companies' attempts to gain a competitive advantage or carve out a niche in this hostile environment has resulted in strikingly different approaches to service.

Our initial guidebook for navigating the slide wilds was the Manhattan Business-to-Business Yellow Pages. We found over 50 different bureaus listed, but only 10 proved capable of imaging PC graphics files. Four more dropped out for various reasons, leaving us with the six fittest survivors. We asked each to process the same set of *Harvard Graphics*, *Microsoft PowerPoint*, and EPS files that we sent out to the national bureaus. The following is an account of that voyage.

DO-IT-YOURSELF SLIDES

Where users are concerned, the Beekman Group's approach to slide processing is minimalist. Its bulletin board does little more than record your name and provide a means to upload the two types of files you must create yourself: a customer file with shipping and processing information and the actual files to be processed, in zipped form.

Beekman would process the *Harvard Graphics* slides for us only if we sent them as SCODL files. The company images files at 4,000-line resolution using Matrix Forte and QCRP cameras, but the resulting fonts and kerning are at best adequate. The cost for the 24-hour turnaround we requested is \$9.95 per file.

Brilliant Image uses the same Ma-

processing, frequently relisting items to make certain they are entered properly. It also provides users with other useful tidbits, such as what they should know before sending files for the first time, as well as lists of the version number and telephone number of each supported package.

Brilliant Image processes native *Harvard Graphics* files. Though it uses

Before embarking on a local expedition in search of slides, arm yourself with as much information as possible. Here are some tips for getting the most from a local slide service bureau.

- When you're shopping for a service, see how much data the company asks you for. This information takes time, but in the long run, the more information and details these services harvest from you, the easier it is to fix things when they go wrong.
- Ask if you can log on to the service's bulletin board or get a copy of its communications software before committing to it. This will give you an idea of how easy it is to interact with the service.
- Provide laser printouts of the files you're asking the service to process, so their staff will know what the slide text should look like. This is particularly important if you plan to make use of hardware fonts, which will have different widths than the fonts built into your software.

Also tell the service what colors to expect. Inadvertent use of the wrong color palette can produce bizarre and hideous results, and informing your service allows them to catch such palette swaps before they reach you.

If you're imaging slides from native files, be sure to tell the slide service what version of software you're using. Also indicate what kind of gradient background you've specified. If you've used any customized palettes, send them along if possible.



trix Forte cameras and 4,000-line resolution as does the Beekman Group, and charges about the same price (\$10) for its standard 24-hour turnaround. But that's as far as the similarities go. The main difference between the two services is Brilliant Image's bulletin board, which collects every conceivable scrap of information required for

Agfa Matrix film recorders, it uses Version 2.3's superior software fonts instead of the uneven-looking Matrix hardware fonts. Accordingly, its slides looked very good, though not quite as good as the *Harvard Graphics* slides produced for us by MAGICorp. At the time of our review, Brilliant Image was able to image the *PowerPoint* slides

are more trouble to use and less predictable in output than the tied-in national services. Consequently, they're not as suitable for those presenters who produce slides only occasionally.

Another alternative for frequent presenters is producing your own slides. You can now buy a digital film recorder with full 24-bit color support for as little as \$4,500 (see "Film Recorders" in this issue). This gives you a measure of control

and security you wouldn't otherwise have, but bringing a film recorder into your office is like making a commitment to a problem child. You must take into account the costs of proper care and feeding, and become an expert in numerous operational details. The slides tend not to look quite as good as the slides produced by the professional film recorders that slide services

use. And you lose the benefits you can get from talking with bureau employees, who are often more than willing to share design and color hints.

FIVE IN THE BOX

Though they're not the cheapest way to get slides, the national bureaus with custom links to PC presentation packages offer a practical deal for many business users. In this article, we review the service and out-

only on a test basis, using its Macintosh driver. This was not very successful. Brilliant Image, however, is gearing up to support *PowerPoint* via new color PostScript drivers, which it says will work better.

A LOW-RES APPROACH

Unlike any of the other local services, Computer Graphic Resources shoots images at 2,000-line resolution unless specifically asked to shoot at 4,000 lines. The cost for this low-resolution approach is a surprisingly high \$12 for 24-hour turnaround on slides produced with Solitaire and Genigraphics cameras.

The *Harvard* slides that Computer Graphic produced for us looked good save for the noticeable jaggiess that the lower resolution creates. The *PowerPoint* slides looked better but also exhibited some problems, mainly because of the different-size fonts the company substituted for the ones we'd initially used in the slides. The fact that the slides were translated into Macintosh format for imaging may have made the problem worse, since fonts and leading don't always transfer well in such cases. The service has a modem and bulletin board, but neither was working during the period when we did our testing.

If you're a fan of the "in by noon, delivered next day" approach, Expressslides provides the best deal. It's the only one of these services to provide 8-hour turnaround for under \$10 per slide (\$9.95 to be exact). Twenty-four hour processing is a low \$5.95. There is a catch, however: Despite its 212 area code, the service actually resides in New Jersey, which means higher couri-

er fees. Still, it's quite a deal: the bulletin board is thorough, the service people quite attentive, and the company did a good job of imaging our *Harvard* slides using Management Graphics Solitaire recorders (Expressslides prefers to receive SCODL files, but it can image *Harvard*'s native .CHT files). The *PowerPoint* files didn't come out quite as well, but like Brilliant Image, Expressslides expects to begin processing color PostScript files soon.

SURPRISING PRICE

The Jack Ward Color Service Center sounds like more of a bargain than it actually is. At \$4.95, its 24-hour service price is the lowest of this bunch; it also can offer next-day courier delivery for as low as \$11.95 if you get your files to the company by noon. It was the only one of these services to use its own communications software, which collects a good bit of information from users. But though the service's standard resolution is 4,000 lines with its Solitaire cameras, the *Harvard* slides we processed looked more like 2,000 lines, with noticeable jaggiess and fuzziness. And though we paid \$25 for a special *Windows* driver disk, we found that the fonts in the *PowerPoint* slides we used it with did not come out at all as we expected them to.

SlideGrafix is far from the most technically proficient service, though their staff tries hard to please. The company had a really difficult time trying to produce our slides. SlideGrafix originally accepted our *Harvard*, *PowerPoint*, and EPS files, but the latter two were on a test basis only and ultimately could not be produced. The *Harvard* slides exhibited some problems, as

well. Though the company made every attempt to remedy them to our satisfaction, the service never succeeded in producing acceptable slides despite its persistence. SlideGrafix has no modem and uses Management Graphics Solitaire and Matrix QCR recorders at 4,000 lines of resolution. Slides processed in 24 hours cost \$10.

WHICH PRICE IS WHICH?

Based on our exploration, we can make two generalizations about local services. One is that these companies have better prices than national services, if it's 24-hour turnaround you're after. That's important, since it's the time frame that most customers request. But as with the national services, you often have to weed through complex and convoluted pricing schedules to find out which deal is actually the best.

On the other hand, these lower-priced slides just don't look as good as those produced by national services. The best slides that the local services offered exhibited far more problems than the worst nationally produced slides. Font-swapping was a huge problem, especially in *PowerPoint* slides. The local bureaus use less-expensive cameras, which is often painfully apparent in the output. Gradient backgrounds, in particular, looked amateurish compared with what the national services brought forth.

Most of the local bureaus were extremely willing to work with us, though, so with patience and encouragement you can train your local bureau to adapt itself to your needs. If you have time, patience, and the sense of perseverance, the potential for financial reward is great. ■



When you build a better mous

Microsoft® Mouse devotees number over 6 million, and counting.

Just what kind of mouse inspires people this way?

Well, the kind with a patented ergonomic design and high resolution, 400-points-per-inch tracking.

The kind of mouse that wins the *PC Magazine* Editor's Choice Award and Technical Excellence Award.

Not to mention the Innovation in America Design Award from *Business Week*, the Industrial





e, you build a bigger following.

Design Award from *Industrie Forum* and others.

And incidentally, no mouse works better with another innovation of ours, Microsoft Windows[®] graphical environment version 3.0.

To track down America's num-

ber one mouse, call (800) 541-1261, Department Q02.

We'll be happy to point you in the right direction.

Microsoft[®]
Making it all make sense[®]

put of five such companies, all of which include communications software built into the package or bundled with it. The best-known and most established of these are Autographix Overnight Slide Service and MAGICorp. Autographix has ties with Software Publishing Corp. and Lotus, vendors of market leaders *Harvard Graphics* and *Freelance Plus*, while MAGICorp has bundling agreements with a wide range of vendors, including the latter, and supports the former.

Two others, Genigraphics Corp. and Slidemasters, are newcomers to the national scene. The former is a national organization that has recently become more important to PC users through its link with *Microsoft PowerPoint*. And Slidemasters is a regional bureau that aspires to become a national force through its support of the Micrografx products *Charisma* and *Designer*. Finally, Kinetic Presentation Centers offers an alternative approach: Instead of imaging from a broad range of packages, Kinetic relies on its own software (*Kinetic Words, Graphs & Art*), which is optimized for use with its service.

These bureaus differ in organization as much as in their origins. Both Autographix and Genigraphics, for instance, boast large networks of affiliated local bureaus as well as a national center for slide production. Kinetic does the bulk of its work at three interconnected bureaus in Louisville, St. Louis, and Cincinnati, but it does have a smaller network of affiliates as well. All three of these services also have international networks of satellite bureaus. In contrast, MAGICorp and Slidemasters do all their imaging in central bureaus.

From the user's point of view, though, these companies are much the same. All offer some form of custom software to help you prepare your orders and transmit them. Once you've finished creating your presentation, you can specify your order information in software: your billing and address information, the number of copies you want, and the types of media you want (this is a convenient way of ordering color prints or transparencies along with your slides). You may also specify gradient backgrounds. All of this information is logged for use in tracking your order.

You can usually create a disk that can be mailed for processing, but it's usually best to transmit your files directly to the service center by modem. Order disks don't tie up your computer, but sending the disks by mail or courier necessarily adds at least one day to the time it takes to get

slides, so most people will prefer the latter course of action.

We tested all of the bureaus we reviewed by using their own communications packages and bulletin boards, all of which are provided free of charge to customers. Fortunately for the health of your wallet, Genigraphics, MAGICorp, and Slidemasters all have established toll-free data lines, and Autographix has a distributed network, so if you live in a major city in the United States you can probably reach



EDITORS' CHOICE

• MAGICorp

If the goal of a service bureau is to let you create the best-quality slides with the least amount of trouble, MAGICorp is the one to pick. Its slides are of high quality (much better than those of Autographix Overnight Slide Service). And though its prices are on the high side, its excellent service makes it worth what it costs. MAGICorp supports a good range of packages, many directly in their native file formats, and its highly organized support system, which includes palette slides and tips, makes using a service bureau relatively straightforward. Whether you're a *Harvard Graphics* or *Freelance* user, or if you use one of the other presentation packages (including *Applause II*, *Charisma*, and *DrawPerfect*) with bundling agreements, MAGICorp will give you excellent results.

Though it's less suitable overall for most business graphics users, Genigraphics Corp. deserves honorable mention for its innovative approach to slide imaging, which includes not only intelligent drivers that attempt to predict any problems that may occur but also color-coordinated palettes and even customized clip art—all for as little as \$10 per slide. *Microsoft PowerPoint* users already benefit from the high quality, rapid turnarounds, and good prices that Genigraphics offers, as do professional users who need to image PostScript slides. Its example sets a mark for other services to match.

one of its affiliates for the price of just a local phone call.

HELP AT THE END OF THE LINE

Though most of these national bureaus are quite large, all attempt to provide personalized service by assigning account representatives to each person who calls to place an order. Generally, we were favorably impressed with the level of guidance each service could offer. Though we did encounter teething troubles with every bureau, the process became much smoother once we had established a relationship.

For this reason, it's always a good idea to contact the service before you create your files. This gives you an opportunity to discover any limitations in fonts, backgrounds, and colors that might apply to your software and to garner useful tips that might save you some grief. MAGICorp, in particular, has a well-organized system of help for users, which includes palette slides plus a document of hints and procedures for your particular graphics package.

Still, you'll have to educate yourself to the process a bit to get the best results. For instance, it's almost always preferable to send native files if you can, as these tend to be compact and to contain all the information you need (with some exceptions; with *Harvard Graphics*, it's important to send the palette files if you want to ensure proper color matching). If you can't send native files, all these bureaus support at least one standard file format—usually SCODL, the native language of Agfa Matrix film recorders. Some bureaus are also equipped to accept CGM, TIFF, and Targa files.

If you regularly need transparencies, it's worth inquiring exactly how they're produced. Most of the bureaus we reviewed create 8 by 10 transparencies by using the Cibacopy process to optically enlarge images originally recorded on 35-mm. film. Since this takes an extra step, large transparencies usually take a day longer and are more expensive than slides. The process also tends to magnify any artifacts present in the original. Transparencies can be produced more quickly and cheaply using plotters or color laser copiers. But for the very best in quality, you'll want a bureau that can create transparencies directly on a film recorder, using an 8 by 10 transparency back and a high-end recorder capable of 8,000-line resolution.

Finally, it's worth your while to study the company's price schedules carefully to figure out how you can get the best deal. All the services can provide same-day,

SLIDE SERVICE BUREAUS

one-day, or two-day service, with overnight air shipment. But each bureau has an optimal standard price, and you can save a lot of money if you're willing to pay close attention to deadlines. At Genigraphics, for instance, same-day service can cost as little as \$9.95 per slide if you can get the slides in by 9 A.M., but the price goes up to \$19.50 per slide if you wait until evening. And if you're willing to wait as long as three days for your slides, you can get some truly good bargains: Slidemasters charges only \$9 per slide for two-day turnaround service, while Kinetic charges just \$6.

EVALUATING THE BUREAUS

We evaluated slide service bureaus much as you would yourself: by sending the companies a group of images to be turned into 35-mm. slides and 8 by 10 transparencies. As much as possible, we tried to preserve our anonymity so that we would have the same type of experience that an end user would face.

Our testing procedure consisted of sending three groups of test files to each of the bureaus. One group consisted of *Harvard Graphics* slides similar to what you'd produce for a presentation, plus a few sample slides to evaluate the quality of the serif and sans serif hardware fonts. As the best-selling presentation package, *Harvard* is supported by all the services. Kinetic, however, requires *Harvard* files to be converted to CGM first; also, since it doesn't support gradient backgrounds within the package, we were able to evaluate the services' ability to apply them.

Our second group of test slides came from *Microsoft PowerPoint*. It included a range of word charts and data charts with various types of gradient backgrounds, plus a few test slides with such difficult effects as angled gray gradients, which we used to check for color and banding problems. This group of slides evaluates the service's ability to handle *Windows* applications. We sent an identical group of slides in EPS format to the services that support it. These tests were supplemented by the sample slides produced during our testing of presentation graphics software (see "Presentation Graphics"), most of which were imaged using one of these services.

We rated the slides using a panel of PC

Magazine editors in a projected screening ("Slide Services: Output Quality"). Though all of the slides were of acceptable quality, there were noticeable variations, particularly when it came to text handling and the placement of gradient fills. Letting the slide service bureau apply hardware

If you regularly need transparencies, inquire how they're produced.



fonts and gradient backgrounds has its advantages; you'll usually get sharper text and smoother, more attractive gradients or photographic backgrounds. But there are drawbacks as well. Usually, you must pick a single gradient for the whole presentation, so you can't experiment with variations on a theme. And hardware fonts tend to have slightly different widths than the fonts built into your graphics package, which can lead to alignment and justification problems if you're not very careful. Essentially, you don't know much about what the slides are going to look like until you get them.

THE BEST CHOICES

In the end, the best results were produced by those services with the most tightly integrated approach to slide production. Slides produced by *MAGICorp*, for instance, were uniformly excellent, particularly when imaged directly from within one of the many packages with which it has bundling agreements. Another company, Genigraphics, goes even further: Its link with *PowerPoint* not only encompasses the ability to image *PowerPoint* files—including gradient fills and scalable fonts—directly, but also uses carefully selected well-imaged color palettes and custom clip art. The Genigraphics driver is even intelligent enough to give you feedback on technical problems that may arise in imaging.

But the long-term solution to the problem of matching display to output is PostScript. Though PostScript's many advantages as a robust, standard imaging model with unlimited color and font support have

She's 5 years old.
She's already had
7 names,
16 identities and
21 homes.



Every year thousands of children are kidnapped by their own parents. Beginning the tragic ordeal of life on the run. Child Find offers an end to the running. With our toll-free number and our mediation program, we offer a way out for the parents and for the kids.

For us, it's a labor of love. But unfortunately, we can't operate on love alone.

To find out how you can help, or if you need our help, please call 1-800-A-WAY-OUT. And help another child find a more peaceful future.

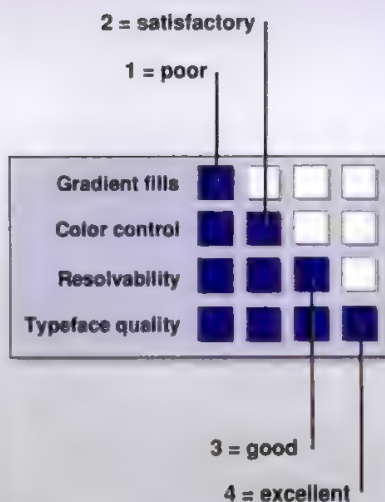


CHILD FIND OF AMERICA INC.



SLIDE SERVICES: OUTPUT QUALITY

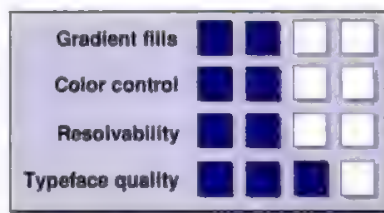
All the national service bureaus delivered slides of acceptable quality, but occasional problems did occur. Use these ratings to get an idea of which service has the best-looking slides and how they compare with the slides produced by desktop film recorders (see the sidebar "Evaluating Slide Quality" for our method of judgment).



AUTOGRAPHIX OVERNIGHT SLIDE SERVICE



The Autographix slides were merely acceptable in quality. Their main deficiency lay in color control: There was perceptible overactivity on the red end of the spectrum, resulting in muddiness in green gradients and a pinkish cast on gray gradients.

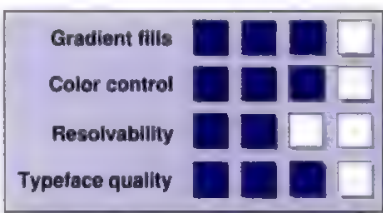


Gradient fills evaluates the quality of the transitions within a gradient-filled background, with an eye for the presence of banding (visible transitions between shades) and vignetting (too abrupt a transition between top and bottom colors). A satisfactory slide may have some vignetting and banding. Slides with no banding earn higher marks; those with neither banding nor vignetting earn the best score.

GENIGRAPHICS CORP.



In general, Genigraphics slides looked good. The gradient fills were smooth, with little vignetting, while the typefaces were attractive and well rendered. The only significant problem was occasional slight fringing.



made it a dominant force in the printing world today, it's just beginning to catch on in the world of slides. More and more professional slide producers are using high-quality drawing programs—like *CorelDRAW* and *Arts & Letters*—that can incorporate PostScript images, and this has encouraged PostScript support among slide bureaus. Of the ones we reviewed in this roundup, Autographix, Slidemasters, and Genigraphics support PostScript slides today, and the better regional bureaus also offer this service. As more business graphics packages begin to support the PostScript language, business users can take full advantage of this trend.

You'll have a wide choice of services if you use *Harvard Graphics* or *Freelance*. But if you don't, your choice of a slide bureau is probably determined by the presentation graphics software you choose—with few exceptions, only one company will have a custom link with a given package. For this reason, the quality of the linked slide service bureau should be a factor in your choice of a package.

Autographix Overnight Slide Service

All reviews by Kellyn S. Betts

Autographix Overnight Slide Service became well known as an authorized bureau for *Harvard Graphics* slide production. But even if you use one of four other popular presentation graphics programs—including *CA-Cricket Presents* and *Lotus's Freelance Plus*—Autographix's network of 22 bureaus is good at creating slides, overhead transparencies, or prints for you in a rush.

Autographix's service is based on "Presentation Partners" in 16 U.S. cities. Five of these "partners" bear the name Autographix, and the company says that the vast majority of its business is conducted by people working through the center closest to them. All bureaus use Celco or Matrix Solitaire film recorders, and 4,000-

line resolution is standard for slides. Autographix also has a so-called SuperCenter as an alternative to these local bureaus. Located in Memphis, Tennessee, across the street from Federal Express, it can accept files until as late as 7 P.M. for next-day delivery.

Autographix specializes in delivering same-day service, and if you need your slides this quickly, its prices can be attractive. Processing your slides at Autographix's Memphis SuperCenter can cost just \$12 each if you get them in by 4 P.M.; slides received between 4 P.M. and 7 P.M. cost a reasonable \$20 each. If you're willing to pick up your slides at your local Presentation Partner bureau, you can save on shipping charges, and if you get them in early enough you can pick them up that same day. Unfortunately, neither the Memphis SuperCenter nor most of the local bureaus offer toll-free data lines, so you'll have to add any phone charges to the cost of your slides. And Autographix does not offer a lower-cost one-day service option, as does *MAGICorp*.



Color control reflects the presence of fringing (a visible halo of a third color between two differently colored objects) and any visible inconsistencies in color density, saturation, or balance. A satisfactory slide is one that has good overall color balance; the best slides lack fringing and have fully saturated colors.



Resolvability evaluates the recorder's ability to produce thin, smooth lines and curves. In practice, recorders with poor resolvability have characters or objects with jagged lines or a fuzzy appearance. A satisfactory slide may have slight jaggedness or fuzziness on text or objects.



Typeface quality concerns the aesthetic characteristics of the default serif and sans serif fonts resident in the film recorder that the service uses. Satisfactory typefaces are attractive, with no egregious tracking problems; good typefaces have no tracking inconsistencies at all, although intermittent problems with kerned pairs are acceptable.

KINETIC PRESENTATION CENTERS

Overall Quality



Since Kinetic's main business is imaging slides created with its own *Kinetic Words, Graphs & Art* package, we created similar but not exact replicas of our *Harvard Graphics* slides to use with this service. Kinetic's slides looked good—with vivid colors, smooth gradients, and attractive, smoothly rendered text. They did, however, exhibit quite a bit of vignetting.

Gradient fills



Color control



Resolvability



Typeface quality



MAGICORP

Overall Quality



MAGICorp produced the best *Harvard Graphics* slides of the bunch. Although the gradients showed a hint of muddiness, they were unbanded and showed little vignetting. The text was attractive, for the most part, and both text and graphics were smoothly rendered, with no fringing at all.

Gradient fills



Color control



Resolvability



Typeface quality



SLIDEMASTERS INC.

Overall Quality



Slidemasters had uneven results. Its PostScript slides looked quite good, but some of the objects dropped out of its *Harvard Graphics* slides, and its *Microsoft PowerPoint* slides had severe problems with text and imported bitmaps. Jaggies were very noticeable in both of the latter series, and the text was poorly tracked. *PowerPoint* gradients were strongly vignettted and showed some color shifting as well.

Gradient fills



Color control



Resolvability



Typeface quality



SERVICE A SPECIALTY

Autographix is able to offer some other special services through its network of bureaus. For example, all Presentation Partners have Ilford equipment to create overhead transparencies and prints by optically enlarging slides. In addition, one of the two Chicago offices has a Kodak 7700 film recorder that can create 8- by 10-inch-sized output in one step, though only at 4,000-line resolution (software limitations prevent *Harvard Graphics* from producing images of more than 4,000 lines, according to Autographix). You have access to these services from any Autographix bureau. Autographix also offers 101 special backgrounds, the vast majority of which are gradients, but some are grids and a few other miscellaneous patterns. All are depicted in a full-color booklet.

The centers we contacted in the course of our testing provided pleasingly personalized service. A New York City bureau representative took time to explain the different backgrounds that the service supports when we had problems with the gra-



FACT FILE

Autographix Overnight Slide Service

63 Third Ave., Burlington, MA 01803; 800-548-8558, 617-272-9000.

List Price (35-mm. slides): Same-day service, overnight delivery: \$12 each if received by 4 P.M., \$20 each if received by 7 P.M. Local bureau deadlines differ.

(8 by 10 transparencies): Two-day service: \$15 each if received by noon, \$25 each if received by 3 P.M. Local bureau deadlines differ.

Delivery Options: Overnight air, \$20 per shipment.

In Short: A large network and good prices on rush service make Autographix attractive to those who value quick turnaround times. But the quality of its slides is less impressive than the scope of its service, and its lack of toll-free lines may add to your bill.

CIRCLE 619 ON READER SERVICE CARD

dient backgrounds in a *Harvard Graphics* slide, and another representative was quick to inform us of problems with *CA-Cricket* files. But the end results didn't match the high level of service: The slides

just didn't look very sharp. Some had problems with fringing; in others, color balance problems led to muddy colors and pinkish grays.

COMPLETE COMMUNICATION

Autographix supplies a simple communications program, *To AGX*, for processing slide output. Despite its rather primitive-looking screen design, this program does the job. It's the only one of the communications programs we tested that allows users to specify the type of output (slides, transparencies, or both) they'd like to produce from each separate image within a transmitted slide show. The company was testing a new *Windows* driver with *Microsoft PowerPoint* at review time and plans to do the same with Aldus's *Persuasion* when that product finally arrives.

If you use one of its supported packages, you'll appreciate the fast delivery and convenience that Autographix's large network of offices can provide. But if you're not in a city with an Autographix office, you'll have to spend lots of money



ZEOS® 386SX-20!

Only \$1495.

COMPLETE WITH A FULL 64K SRAM CACHE!

That's right! Now you can own the incredible new ZEOS 386SX 20MHz system, complete with a full 64K SRAM Cache! Rock Solid '386 computing power. Right now, only \$1495.

Your new ZEOS 386SX-20 includes the most advanced SX motherboard available anywhere. Because we've not only added our high speed 64K Static RAM Cache. We've also integrated the hard and floppy drive controllers *plus* the serial, parallel and game ports *right on the motherboard!* This results in even greater reliability *and* expandability.

ZEOS SX SYSTEMS RATED #1!

After all, the ZEOS 386SX-20 comes from a family of *Editor's Choice* '386 systems. And most recently, in PC Magazine's Service and Reliability issue, ZEOS systems received the #1 SX rating overall. When you receive your new ZEOS 386SX you'll see why ZEOS is #1. Take our case and power supply for instance.

Your new system will include our custom 200 Watt power supply and seven bay SpaceSaver desktop case. You save space and still have room

for lots of future expandability! And the components in your system will last longer too because ZEOS gives you not just one, but *two cooling fans*. After all, the cooler your system runs, the longer it will last. Now that's uncompromising value. That's ZEOS value.

24 HOUR A DAY TOLL FREE SALES AND TECHNICAL SUPPORT!

Too, you will receive our legendary *ZEOS 24 Hour a Day Toll Free Technical Support*. Plus our full 30 Day Absolute Satisfaction Money Back Guarantee, One Full Year Limited Warranty and Express Parts Replacement Policy.

Performance. Quality. Price. Support. These are the hallmarks that have made ZEOS America's favorite choice. These are the values that make ZEOS your best choice as well. You're going to be *very* satisfied. We don't just say it. *We Guarantee it.*

ORDER NOW TOLL FREE: 800-423-5891

Order your new ZEOS 386SX now with confidence. Your choice of ZEOS quality and performance is Guaranteed. Order now toll free by calling 800-423-5891.

**THE INCREDIBLE
NEW ZEOS
386SX-20 CACHING
SYSTEM. AMERICA'S
#1 CHOICE!**

ONLY \$1495

- 386SX-20 CPU, 8/20MHz.
- Ultra Fast 64K SRAM Cache providing Superior Zero-Wait State performance.
- 512K of Zero-Wait DRAM, expandable to a System Total of 16MB.
- 42MB High Speed IDE hard drive. Teac 1.2MB floppy.
- ZEOS 14" Hi-Res amber monitor with Tilt/Swivel. Includes Genuine Hercules® brand graphics controller!
- ZEOS/RS 101 key SpaceSaver keyboard.
- Two Serial, one Parallel & one Game Port.
- 6-16, 2-8 bit expansion slots. 80387SX math coprocessor support.
- Rugged ZEOS 7-bay SpaceSaver case with our 200 Watt power supply and two cooling fans for added reliability and product life.
- Includes ZEOS 24 Hour a Day Toll Free Technical Support and Customer Satisfaction package.

Options Galore:
Including 14" 1024 VGA, more memory, an incredible selection of hard drives: SCSI, IDE, ESDI RLL or MFM and virtually any other add-on you could want. Ask about other special money saving packages too.

**ORDER NOW TOLL FREE
800-423-5891**

FAX Orders: 612-633-1325
In Minnesota: 612-633-459
Outside US and Canada:
612-633-6131

MasterCard, VISA, Discover Card, Am Exp, Z-CARD and COD.

Open 24 Hours a day,
365 Days a year!

All prices and specifications are subject to change without notice. Please call for current pricing and warranty details. ZEOS is a publicly traded company, NASDAQ Symbol: ZEOS. © 1990 ZEOS International, Ltd., 530 5th Avenue, N.W., St. Paul, MN 55112. All product and company names are trademarks or registered trademarks of their respective holders.



on toll calls. And since in our experience the slide quality leaves something to be desired, you may want to look elsewhere if you need the best.

Genigraphics Corp.

A relative newcomer to the field of slide services, Genigraphics has risen like a shooting star through its high-quality link with *Microsoft PowerPoint*. Its view of the rest of the market is equally promising, though less focused.

Genigraphics first made its name as a manufacturer of high-end film recorders, and it still uses Genigraphics recorders to produce slides, though it no longer owns the company that makes them. Though some of the bureaus in its network can process files from other programs, Genigraphics focuses most of its efforts on *PowerPoint*. If you use this package, Genigraphics can produce slides that look exactly the way you expect them to for as little as \$10 each.

PowerPoint's WYSIWYG interface does a good job of showing you what your output will look like, and its abilities are greatly enhanced by Genigraphics' collaboration with Microsoft. Genigraphics chose *PowerPoint*'s built-in color schemes, for instance, specifically to work well on slides. When you choose to print a presentation to the Genigraphics driver, the program shows you the relative sizes and colors your images will have as slides. If the font displayed on-screen is not one it supports (only nine typefaces as well as symbols and Zapf dingbats are supported) and a new one is substituted, the program will point it out. It will also tell you if an image will have portions cut off in the slide-making process.

GREAT PRICES

When you place an order, the default destination is the central Memphis office. The well-written Microsoft-produced manual tells that if you don't choose the office nearest you, Genigraphics will automatically route your transmission to the center that can process it for optimal utilization of the network. You can also choose whichever of the 22 bureaus throughout the U.S. and Canada—20 of which bear the Genigraphics name—is nearest to you. No numbers need be typed.

The company's prices are extremely

GRAPHICS SLIDE SERVICE BUREAUS

competitive, particularly for rush service. The most expensive option gives users until 6 P.M. to transmit slide orders for next-day delivery at \$19.50 each, but this is still lower than some companies' cheapest next-day rate. The least-expensive option is \$9.95 for shipments received by 9 A.M. for next-day delivery, \$5 lower than any of its competitors' lowest prices. Overhead transparencies and prints are on the same price schedule but take longer to be produced, requiring one, two, or three full business days for delivery.

The company's prices
are very competitive,
particularly for
rush service.



EXTENSIVE COMMUNICATION

Graphics Link 1.0, the Genigraphics communication program for *PowerPoint*, is accessed outside the presentation graphics program. When a presentation is "printed" by the slide service driver, however, most of the information required to make the transmission (or create an order disk) is collected, including the order and billing details. You cannot specify quantities other than entire sets, but a dialog box for special instructions provides ample room for such details. A copy of all the information

thus harvested is sent to the top of a queue in the communications module.

When *Graphics Link* is called up, it displays the name and date of the last modification of every file it has been used to create or send, the only one of the communications programs provided by these service bureaus to do so. When you call it up, this historical information is displayed on an order form. For those files that have yet to be sent, the estimated transmission time is displayed as well.

During a transmission, which is made through a toll-free line, the program displays and constantly updates every conceivable scrap of information you might need:

the time it began, when it's estimated to be completed, the total number of bytes and the number yet to be sent. The transmission's relative progress is also shown graphically with a thermometer icon. This is far more detail than any of the competitors' programs provide.

The program also gives users control over more communications parameters such as the initialization command and the disconnect sequence.

HIGH-QUALITY OUTPUT

The *PowerPoint* slides and transparencies that Genigraphics produced for us were of consistently high quality. This is especially interesting since the bureau's standard resolution is only 2,000 lines. The reason that the slides look like they were imaged at 4,000 lines—according to the company—is due to the use of rectangular, as opposed to standard, square pixels. Because slides are rectangular, these rectangular pixels provide 2,000 lines of resolution both horizontally and vertically.

Because of Genigraphics' tight link with *PowerPoint*, you'll rarely have problems that require service assistance. We did, however, have quite a scare when Genigraphics reported that it lost a successfully transmitted group of files because of an overnight power outage. We didn't learn of the mishap until the day we called to find out why we hadn't received our return shipment. Eventually our file turned up, after much apologizing by Genigraphics' service people.

From its pricing to the thoroughness of its link to the quality of its end product, Genigraphics is ideal for *PowerPoint* us-



FACT FILE

Genigraphics Corp.

Two Corporate Dr., Shelton, CT 06484; 800-638-7348.

List Price (35-mm. slides): Same-day service, overnight delivery: \$9.95 each if received by 9 A.M., \$12 each if received by 1 P.M., \$19.50 each if received by 6 P.M.

(8 by 10 transparencies): Three-day service, \$9.95 each, two-day service, \$12 each; one-day service, \$19.50 each. All must be received by 1 P.M.

Delivery Options: Overnight air, \$20 per shipment.

In Short: Genigraphics produces excellent results with *Microsoft PowerPoint* through innovative custom drivers, and it offers fast turnarounds, high quality, and good prices.

CIRCLE 620 ON READER SERVICE CARD

Quick, do you know
the first name
in microprocessors?

_____ 486™

_____ 386

_____ 386sx™

GRAPHICS

SLIDE SERVICE BUREAUS

SLIDE SERVICE BUREAUS: SUMMARY OF FEATURES

Bureaus listed in alphabetical order



	Autographix Overnight Slide Service	Genographics Corp.	Kinetic Presentation Centers	MAGICorp	Slidemasters Inc.
MEDIA					
35-mm. slides	■	■	■	■	■
Plastic mounts	■	■	■	■	■
Glass mounts	■	■	■	■	■
Extra fee (per slide)	\$1.50	\$1.00	\$1.50	\$1.00	\$1.25
4- by 5-inch transparencies	■	■	■	■	■
8- by 10-inch transparencies	■	■	■	■	■
With cardboard mounts	■	■	■	■	■
Sources:					
Film recorder	■	■	■	■	■
Plotter	■	■	■	■	■
Optical enlargement	■	■	■	■	■
Color prints	■	■	■	■	■
Color laser copies	■	■	■	■	■
Posters	■	■	■	■	■
Film recorders used	Celco, MGI Solitaire	Genographics	Agfa Matrix, Crossfield Dicomed	Celco	MGI Solitaire
SOFTWARE SUPPORT					
Business presentation software:					
Applause II	■	■ (via PostScript)	■ (via SCODL)	■	■
CA-Cricket Presents	■	■ (via PostScript)	■ (via SCODL)	■	■
Charisma	■	■	■ (via SCODL)	■	■
DrawPerfect	■	■	■ (via SCODL)	■	■ (via SCODL)
Freelance Plus	■	■	■ (via SCODL)	■	■
Harvard Graphics	■	■ (via SCODL)	■ (via CGM, SCODL)	■	■
Kinetic Words, Graphs & Art	■	■	■	■	■
Microsoft PowerPoint	■	■	■ (via SCODL)	■	■
Pixie	■	■ (via PostScript)	■ (via SCODL)	■	■
Presentation Team	■	■	■ (via SCODL)	■	■
35mm Express	■	■ (via PostScript)	■ (via SCODL)	■	■
Professional software:					
Artline	■	■ (via PostScript)	■ (via SCODL)	■	■
Arts & Letters Graphics Editor	■	■ (via PostScript)	■ (via SCODL)	■	■
CorelDRAW	■	■ (via PostScript)	■ (via SCODL)	■	■
Micrografx Designer	■	■	■ (via SCODL)	■	■
Mirage	■	■	■ (via SCODL)	■	■ (special order)
Standard file formats:					
CGM	■	■	■	■	■ (special order)
HPGL	■	■	■	■	■ (special order)
PICT (Macintosh)	■	■	■	■	■
PostScript	■	■	■	■	■
SCODL	■	■	■	■	■
TIFF	■	■ (b/w only)	■	■	■
Targa (.TGA)	■	■	■	■	■
Windows metafile (.WMF)	■	■	■	■	■
TELECOMMUNICATIONS					
Modem service:					
9,600 bits per second	■	■	■	■	■
800 data-line number	■	■	■	■	■
File compression available	■	■	■	■	■
File encryption available	■	■	■	■	■
Standard protocols	Kermit	Kermit	Proprietary	Kermit	Kermit, Xmodem, Ymodem, Zmodem
Linking software:					
Built into supported programs	■	■	■	■	■
Available separately	■	■	■	■	■

■—Editors' Choice ■—Yes □—No

CONTINUES

Time's up.

Intel 486™

Intel 386™

Intel 386SX™

You scored perfectly. Because Intel is the world's leader in microprocessor design and development. It's also the company that introduced the first microprocessor. And when it comes to investing money into the technology, Intel is first again. Giving you the assurance that with an Intel microprocessor inside your computer, you'll have the power and compatibility to take you into the future.

So if you want all that working for you, make sure the 386SX, 386 or 486 computer you choose has the first name in microprocessors inside. Intel.

intel
The Computer Inside.™

CIRCLE 521 ON READER SERVICE CARD

Intel 486, Intel 386, and Intel 386SX are trademarks of the Intel Corporation. ©1991 Intel Corporation. All rights reserved.

Great Output.



Little ^{\$6995} Input.

You don't have to go overbudget for brilliant overheads, or come up with a lot of hard cash for great hardcopy.

ColorMaster® Plus combines 100% PostScript compatibility with 300 dpi resolution and full color capabilities—yet costs less than any other thermal transfer printer.

ColorMaster Plus is loaded with other high-end features—like color screening capabilities and true 4-color printing on paper or transparencies.

A ColorMaster Plus model is also available with built-in DOS drivers for all the popular presentation graphics programs—like Harvard Graphics—and

New ColorMaster Plus



offers Microsoft Windows compatibility using Zenographics' SuperPrint driver.

And all ColorMaster Plus models come with something you simply can't get anywhere else: CalComp product

quality and long term commitment to service, support and supplies. Our **1-year on-site warranty** is just one example.

Spend a little time now to save a lot more money later.

Call **1-800-932-1212** for more information. In Canada, 416-635-9010.

**We draw on
your imagination.™**

 **CalComp**
A Lockheed Company

CIRCLE 144 ON READER SERVICE CARD

CalComp, P.O. Box 3250, Anaheim, Ca 92803. ©1991 CalComp Inc. ColorMaster Plus and We draw on your imagination are trademarks of CalComp. All other product names, logos, trademarks or registered trademarks are property of their respective manufacturers. *U.S. Suggested List Price. Prices outside the U.S. may vary.

GRAPHICS

SLIDE SERVICE BUREAUS

SLIDE SERVICE BUREAUS: SUMMARY OF FEATURES

Bureaus listed in alphabetical order



	Autographix Overnight Slide Service	Genigraphics Corp.	Kinetic Presentation Centers	MAGiCorp	Slidemasters Inc.
TELECOMMUNICATIONS (cont.)					
Can send slides by modem	☒	☒	☒	☒	☒
Estimates send time	☒	☒	☒	☐	☒
Retains batch transmission information	☒	☒	☒	☒	☒
Creates order disk	☒	☒	☒	☒	☐
Maximum slides per batch	Unlimited	Unlimited	Unlimited	99	Unlimited
SERVICE OPTIONS					
35-mm. slides:					
Same-day turnaround	☒	☒	☐ (on request)	☒	☒
One-day turnaround	☒	☒	☒	☒	☒
Two-day turnaround	☒	☒	☒	☒	☒
8- by 10-inch transparencies:					
Same-day turnaround	☒	☐ (on request)	☐ (on request)	☐	☒
One-day turnaround	☒	☒	☒	☒	☒
Two-day turnaround	☒	☒	☒	☒	☒
Delivery options:					
Same-day courier	☒	☐ (locally)	☒	☐	☒
Overnight air	☒	☒	☒	☒	☒
Second-day air	☒	☒	☒	☐	☒
Customer service options:					
Credit cards	☒	☒	☒	☒	☒
Instant credit (account)	☒	☐	☐	☒	☒
Toll-free customer support	☒	☒	☐	☒	☒
Confidentiality agreements	☒	☒	☒	☒	☒
Saturday service	☒	☒	☒	☒	☒
24-hour production	☒	☒	☒	☐	☐
Special services:					
Counsels users on slide creation	☒	☒	☒	☒	☒
Creates custom slides	☒	☒	☒	☒	☒
Scans logos	☒	☒	☒	☒	☒
Creates custom clip art	☐	☒	☒	☒	☒
Combines slides and photos	☒	☒	☒	☐	☒
Transfers slides to videotape	☐	☒	☒	☐	☒



—Editors' Choice ☒—Yes ☐—No

ENDS

ers. And we hope to see more links like these in the future—from Genigraphics in the form of tight ties to additional packages, and from other bureaus as well.

Kinetic Presentation Centers

In many ways, the network of slide service bureaus that Kinetic presently offers its *Kinetic Words, Graphs & Art* users resembles a group of small multipurpose bureaus that you might find locally. Their setup is far from being state of the art, and their service, though very personalized, is not geared toward overnight turnaround.

The main Kinetic Presentation Center is located at the company's corporate headquarters in Louisville, Kentucky. Other members of the network used to be in Los Angeles and Chicago (these are still mentioned in the program's documentation, but the numbers are now disconnected), but, according to Kinetic, these centers have moved to Cincinnati and St. Louis. Additionally, the company has added affiliates in Cleveland, Indianapolis, England, France, and Hong Kong. Unfortunately, none of the network members offer toll-free lines.

Kinetic's approach to slide bureaus is unique: Its service relies on a presentation graphics package that was designed with slide output in mind. No drivers need to be loaded in order to use the service, save for

the one required to use the modem. The result is an extremely tight link that can furnish good-looking slides of images generated in *Kinetic Words, Graphs & Art*.

Kinetic service centers can image *Harvard Graphics* files, but only by importing them as CGM files into *Kinetic*, which is an arduous process. First you need to export the files in CGM format and then import them into *Kinetic*, which could yield mixed results. No size limits are documented, but we had a problem with an image of 48K that contained 336 objects. When a file is too large, it causes the system to seize up, requiring a reboot, and since Kinetic imports *Harvard* text as polygons, it's difficult to edit. (*Kinetic* imports text in other CGM files, such as those generated by *Freelance*, as text.)

TURBOCHARGED.

Compaq has a peculiar proposition for you.

When their servers are configured similarly to Dell's, they want to charge you up to \$12,500 more for them.

That's bad enough in normal times, but with the tight budgets these days it's ridiculous.

The New Dell Drive Array gives performance a boost. With Dell Drive Array, we've overcome the two big problems that plague most servers: Slow disk subsystem performance, and the difficulty of ensuring data integrity.

Let's tackle slow performance first:

The Dell Drive Array is based on the Intel® 80960 RISC processor. And, depending on the application, can deliver twice the storage I/O performance of a stand alone ESDI drive.

Allowing more users to access the server more

quickly for
greater pro-
ductivity.

As for ensuring data integrity, the Dell Drive Array uses parity checking techniques. So a single disk can guard all the data on up to 4 other disks.

What's more, the Dell Drive Array also uses a standard high performance SCSI software interface. Instead of Compaq's proprietary interface. Which means you can get up and running in just about every operating environment, without requiring special device drivers.



\$15,099

LEASE: \$572/MONTH**

THE DELL® 433TE, 33 MHz i486™ SERVER

1 ARRAY, 5 200 MB HARD DRIVES, 8 MB OF RAM, 128 KB CACHE

THE DELL SYSTEM® 433TE 33 MHz i486 EISA AND THE DELL SYSTEM 425TE 25 MHz i486 EISA.

STANDARD FEATURES:

- i486 microprocessor running at 33 MHz (433TE) or 25 MHz (425TE) with 8 KB internal cache.
- 128 KB external cache (433TE).
- Standard 4 MB of RAM* expandable to 64 MB (eight internal SIMM sockets, each accepting a 1 MB, 2 MB, 4 MB or 8 MB SIMM, installable in matched pairs).
- Socket for WEITEK 4167 math coprocessor.
- 11 internal half-height drive bays.
- Eight 32-bit EISA expansion slots (six EISA master slots and two EISA slave slots).
- High-performance IDE (80 MB, 100 MB, 190 MB and 330 MB) ESDI or SCSI (330 MB, 650 MB) hard disk drives.
- SmartVu™ — Advanced systems diagnostic display.
- 12 month On-Site Service Contract.

VGA Color Plus System with Array of 5 200 MB hard drives

433TE, 8 MB RAM* 33 MHz
425TE, 8 MB RAM* 25 MHz

\$15,099
\$13,199

The Dell Systems 433TE and 425TE are class A devices sold for use in commercial environments only. *Performance Enhancements: Within the first megabyte of memory 384 KB of memory is reserved for use by the system to enhance performance. The 433TE is photographed with optional extras. All prices and specifications are subject to change without notice. Dell cannot be responsible for errors in typography or photography. †Source: From Compaq Computer Corporation 2/11/91 price list. **Payment based on 36-month, open-end lease. ‡Leasing arranged by Leasing Group, Inc. In Canada configurations and prices may vary. Dell and Dell System are registered trademarks and SmartVu is a trademark of Dell Computer Corporation. Intel is a registered trademark and i486 is a trademark of Intel Corporation. UNIX is a registered trademark of AT&T in the U.S. and other countries. Other trademarks and trade names are used to identify

OVERCHARGED.



\$27,698[†]

ACTUAL DEALER PRICES MAY VARY.

COMPAQ SYSTEMPRO 486/33, 33 MHz i486 SERVER
1 ARRAY, 4 210 MB HARD DRIVES, 8 MB OF RAM, 512 KB CACHE

Maintaining servers can be beyond Compaq dealers.

If a server goes down, your whole company can go down.

With a Compaq system, you may have to trust the dealer who sold it to you to fix it. With Dell, you deal directly with us, the company that designs and manufactures your servers.

Which means you'll be working with a telephone support staff that solves 90% of all problems over the phone. Generally in 6 minutes or less.

And because Dell is an AT&T UNIX[®] source code licensee and validates compatibility under Novell and Banyan, you can be sure your Dell technician knows quite a bit about networking too.

But on those rare occasions we can't solve your problem over the phone, a trained service technician will come to your office with a solution in hand.[△]

Dell has even pioneered a new 24-hour TechFax line which automatically faxes you detailed information about your Dell System from the Dell technical library.

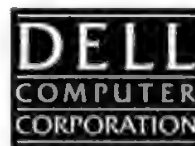
And all this coverage, including a full year of field service, comes at no additional cost to you. Pretty good for a service package that won eight PC Week Corporate Satisfaction Polls.

There's a lot more to know when you buy a server. From the first moment you call

Dell, and for as long as you own your system, we'll work with you and answer any questions—from service and technical issues or the wide variety of credit, lease or lease-to-buy plans available.[°]

So if you're looking for a server that will soup-up your network without blowing your budget, call Dell.

Unless, of course, you like being overcharged and underserved.



the entities claiming the marks and names or their products. Dell Computer Corporation disclaims any proprietary interest in trademarks and trade names other than its own. [△]Service provided by Xerox Corporation. On-site service may not be available in certain remote locations. Shipping, handling and applicable sales tax not included in the price. For information on and a copy of Dell's 30-day Total Satisfaction Guarantee, limited warranty, and Xerox's Service Contract, please write to Dell USA Corporation, 9505 Arboretum Boulevard, Austin, Texas 78759-7299. ATTN: Warranty © 1991 Dell Computer Corporation. All rights reserved.

CIRCLE 474 ON READER SERVICE CARD

ROAD WARRIOR.

There you are, doing battle far from home. Armed with your powerful new notebook computer. As you prep for the next day's conquest, something unexpected happens.

Suddenly you find yourself stranded in some strange hotel room, with your computer down. And no one will come service it.

You wake up in a pool of sweat.

Dreams like this make it very easy to choose Dell's 20 MHz 386SX notebook computer over the remarkably overpriced and underserved Compaq LTE 386s/20.

Because when you buy the Compaq system,

this isn't just a bad dream. It's a real possibility.

TO ORDER, CALL
800-678-1430
FOR FASTER PROCESSING PLEASE REFERENCE #111H4
HOURS: 7 AM-9 PM CT M-F 8 AM-4 PM CT SAT
IN CANADA CALL 800-387-5752

Can you afford not to buy the Dell® 320N?

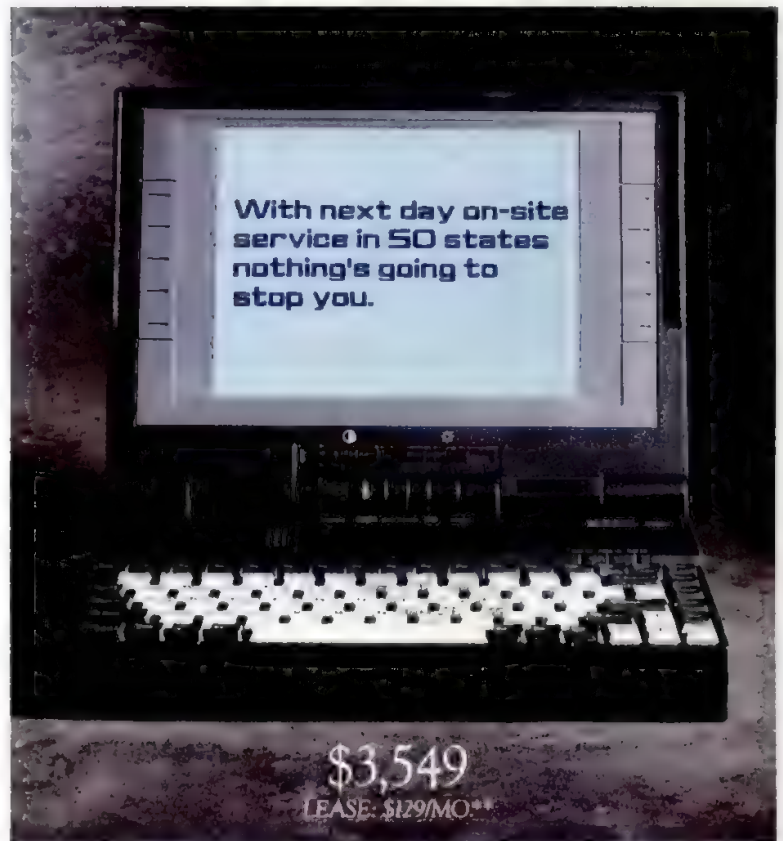
At a time when everybody is cutting budgets, can anyone afford to spend up to an extra \$2,950?

More importantly, can you afford to go on the road counting on service from a Compaq dealer you've never heard of?

Especially when every Dell system comes with a full gamut of road services. Like a toll-free technical support line that helps users solve 90% of their problems over the phone.

And if you need help in the middle of the night, just call Dell's innovative TechFax line. It automatically faxes back detailed information on your Dell computer. Even to your hotel.

If that doesn't solve it, call for road service. A trained



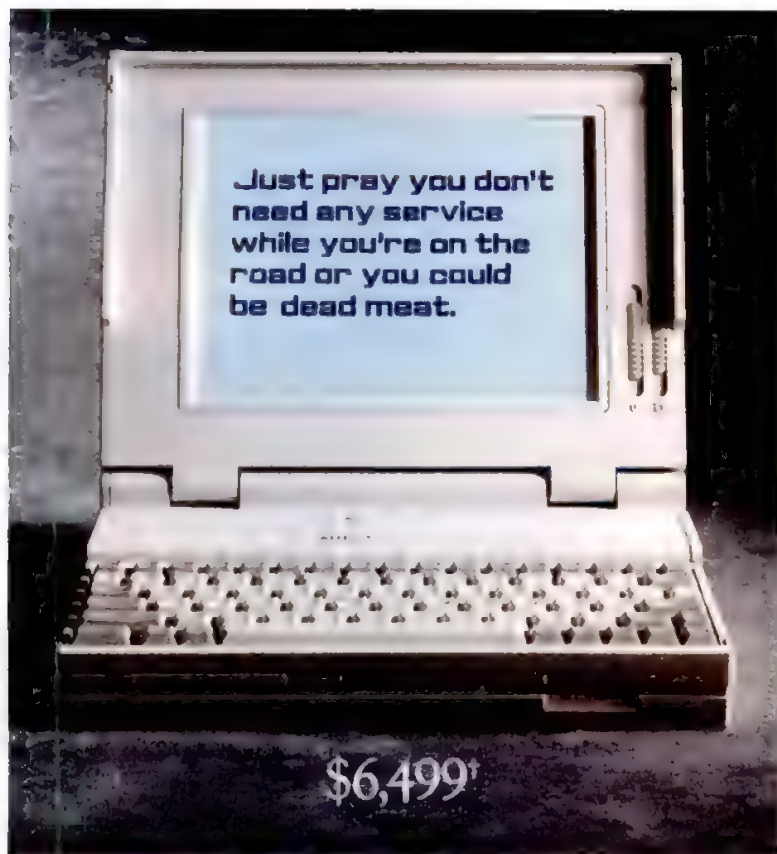
DELL SYSTEM® 320N 386™ SX 20 MHz:
SYSTEM INCLUDES VGA LCD, 30 MB HARD DRIVE, 2 MB RAM.

THE NEW DELL SYSTEM 320N 20 MHz 386SX AND THE NEW DELL SYSTEM 212N 12 MHz 286.

- Intel® 80386SX microprocessor running at 20 MHz (320N) and the Intel 80C286 microprocessor running at 12 MHz (212N).
 - Standard 1 MB of RAM,* expandable to 5 MB (on the system board using 1 MB or 2 MB memory modules).
 - 640 x 480 VGA LCD with edgelight.
 - One expansion slot for Dell Data/FAX modem.
 - 6.4 lbs. with battery; dimensions are 8.5" D x 11" W x 2" H.
 - 3.5" 1.44 MB diskette drive.
 - 85-key keyboard with embedded numeric keyboard.
 - 1 serial port and external VGA monitor port.
 - Selectable parallel printer or external 5.25" disk drive/tape back-up port.
 - Connector for numeric keypad or 101-key keyboard.
 - Mouse port.
 - Removable and rechargeable battery pack utilizing Dell's "Continuous Power Battery System" (patent pending).
- 212N: 20 MB, 1 MB RAM* \$2,399
320N: 30 MB, 1 MB RAM* \$3,399
- 40 MB available for the 212N.
60 MB available for the 320N.

*Performance Enhancements: Within the first megabyte of memory 96 KB of memory is reserved by the system to enhance performance. Can be optionally disabled. All prices and specifications are subject to change without notice. Dell cannot be responsible for errors in typography or photography. **Payment based on 36-month, open-end lease. †Leasing arranged by Leasing Group, Inc. In Canada, configurations and prices may vary. Dell and Dell System are registered trademarks of Dell Computer Corporation. Intel is a registered trademark and 386 is a trademark of Intel Corporation. Other trademarks and trade names are used to identify entities claiming the marks and

ROAD WORRIER.



COMPAQ LTE 386s/20 386SX 20 MHz
SYSTEM INCLUDES VGA LCD, 30 MB HARD DRIVE, 2 MB RAM.
ACTUAL DEALER PRICES MAY VARY.

technician will come to your hotel room, or office, the next business day with a replacement system if necessary. And if possible, your hard drive contents will be transferred on the spot. All at no additional cost for the first year you own your computer.

It's light weight. But it's no lightweight.

Dell's notebook weighs just 6.4 pounds. (1.1 pounds lighter than the Compaq LTE 386s/20). It measures a trim 8½" x 11" x 2". But technically, this is heavy artillery.

The Dell 320N features a built-in 3.5" diskette drive with your choice of high-speed 30 or 60 MB hard drives.

The display is a high quality VGA LCD. There's an optional, built-in Data/FAX modem. And a sliding door that lets you easily insert a math coprocessor, RAM modules or the modem without major surgery. (Dell also has the 212N, a 12 MHz 286 with a 20 or 40 MB hard drive.)

Even the keyboard shows touches of brilliance. It's a complete 85-key layout. Including the special screen navigation keys (Home, End, Page Up, Page Down and separate Cursor keys in the familiar inverted "T" layout) that let you easily navigate even the most spread out spreadsheet. And every key is engineered for extended travel, to provide the familiar touch of a top-of-the-line desktop system.

Don't worry. Be happy.

One more thing to consider. When you buy from Dell, you're dealing directly with a company that has won PC Week's Corporate Satisfaction Poll for PCs, servers and laptops. Not just once.

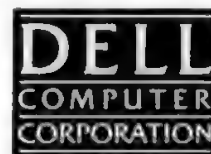
An unprecedented eight times.

A company that will custom configure any system to meet your needs. And then work with you to custom configure a finance or leasing plan.*

And we back it all with a 30-day no questions asked satisfaction guarantee.

Call today for either of our new notebook computers. And hit the road, with a Dell.

That'll really give the guys with the Compaqs something to worry about.



names or their products. Dell Computer Corporation disclaims any proprietary interest in trademarks or trade names other than its own. *Source: From Compaq Computer Corporation price list effective 2/11/91. Service provided by Xerox Corporation. On-site service may not be available in certain remote locations. Shipping, handling, and applicable sales tax not included in the price. For information on and a copy of Dell's 30-day Total Satisfaction Guarantee, limited warranty, and Xerox Service Contract, please write to Dell USA Corporation, 9505 Arboretum Boulevard, Austin, Texas 78759-7299. ATTN: Warranty. ©1991 Dell Computer Corporation. All rights reserved.

CIRCLE 472 ON READER SERVICE CARD

AN EXCELLENT DRIVER

Because of the relatively low volume that Kinetic processes—about 2,000 slides per month—it has invested in less-expensive film recorders than have its peers in this review. But Kinetic has written an excellent driver for its Matrix PCR film recorders that is specifically designed to work with the CGM files that its software creates. Thanks to the software fonts and kerning tables included in the driver, the service's output far surpasses what the PCR recorder can create on its own using hardware fonts. The end results are truly impressive—our panel of reviewers deemed Kinetic's standard 4,000-line resolution images quite good.

Kinetic's communications utility is easily accessible from inside *Kinetic Words, Graphs & Art's* many-layered menu structure. It allows users to transmit files by modem and to create an order disk to send to Kinetic. The order form is notable for the very long comments section at its end, which has sufficient space to include the most detailed processing instructions. Unfortunately, you can only communicate at 1,200 bits per second, and the company does not provide a toll-free data line. The

communications program exhibited some time-out problems as well.

NON-RUSH PRICING

Kinetic Presentation Centers' pricing structure is better for one- or two-day service than for rush orders. Though the center can process slides for what it terms an "ASAP" order with same-day turnaround for \$18 per slide—what we determined to be the standard request—this is clearly a special order that must total over \$50 and be received by the center before noon of the day it is to be processed; it must also be verified prior to the transmission. The company's longer one- and two-day processing prices of \$9 and \$6 per slide, respectively, are very reasonable though. At the same \$18 per transparency—or \$9 for one-day and \$6 for two-day service—its 8 by 10 transparencies cost significantly less than those of any of the other bureaus except Slidemasters. But they are produced with a Calcomp Plot Master and are of a far lower quality than those produced by any of the other companies we reviewed.

Our experience indicates that Kinetic's

approach is useful to but a tiny fraction of our readers. Kinetic, however, says it intends to be quite a different network of bureaus by the time you read this. At the time of this review, the company was in the process of metamorphosing into a center that produces slides and other output from a number of different software packages; a

**FACT FILE****Kinetic Presentation Centers**

250 Distillery Commons, Louisville, KY 40206-1990; 502-583-1679

List Price (35-mm. slides): Two-day service, \$6 each; one-day service, \$9 each; same-day service (by special arrangement with local bureau), \$18 per slide

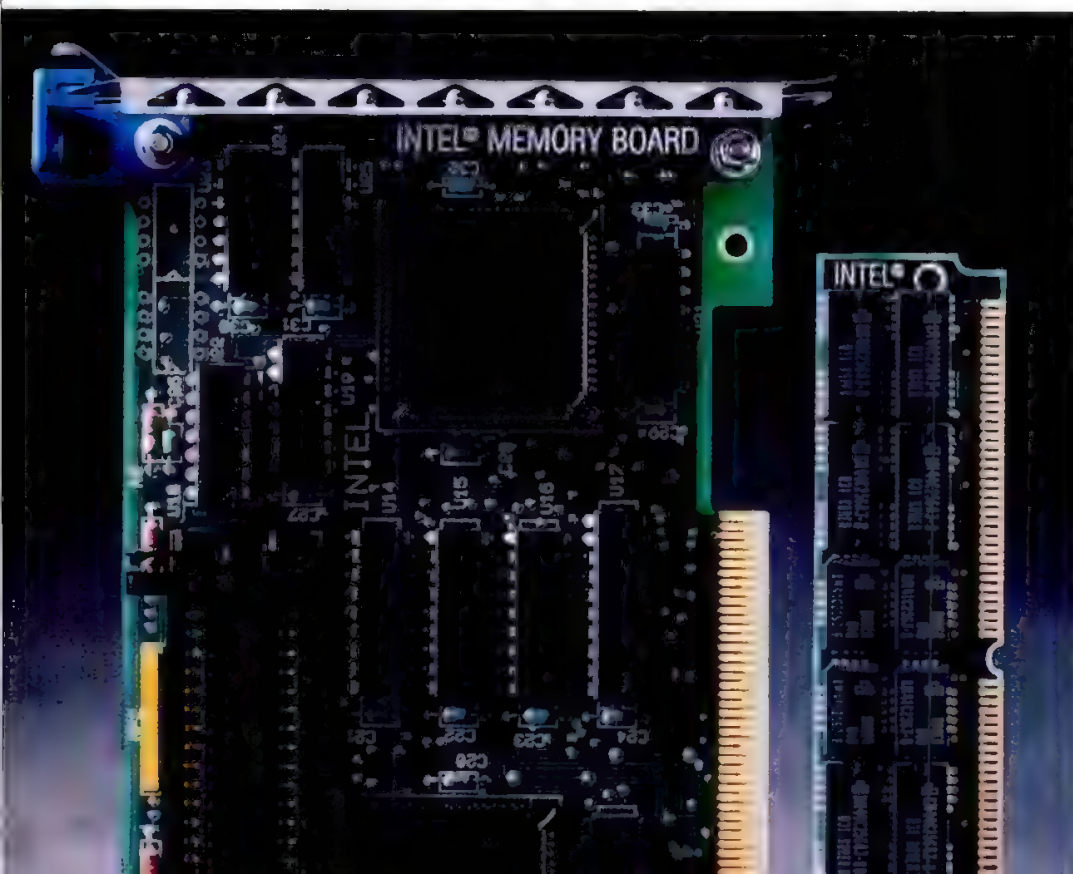
(8 by 10 transparencies): Same as 35-mm. slides

Delivery Options: Overnight air, \$14 per shipment; Second-day air, \$7.50 per shipment.

In Short: While Kinetic can produce nice-looking results, they're currently obtainable only if you use Kinetic's own *Kinetic Words, Graphs & Art* package. Its plan for future expansion will be necessary if it is to serve as a usable alternative for most PC slide makers

CIRCLE 621 ON READER SERVICE CARD

Power.



spokesman says it plans to begin with *Harvard* and *Freelance* files but hopes to expand from there. In addition, Kinetic says it is in final beta-testing stages of a communications driver that will support up to 9,600-bps communications for *Harvard* and *Freelance* users. The company's excellent software fonts and kerning tables also will be accessible with these communications drivers.

The company also says it has made a major investment in a Canon CLC-500 color printer, so the quality of its overhead transparencies and handouts should increase tremendously. In the beginning, at least, it expects to offer these new services with the same standard 24-hour in-house turnaround. If the company can maintain its top-notch personalized service with these new customers, it has a good chance of succeeding.

While *Kinetic Words, Graphs & Art* users can take advantage of the tight link between this service and their software for good prices and high-quality slides, at this point we can't recommend Kinetic's slide service to anyone else. We do suggest that you users of other programs keep your eyes open for the name Kinetic, however.

MAGICCorp

When MAGICCorp entered the slide-making business 12 years ago, the process of computerized slide generation may have seemed supernatural. Today, though, the magic lies not in the company's name, but in how well MAGICCorp compares with its rivals.

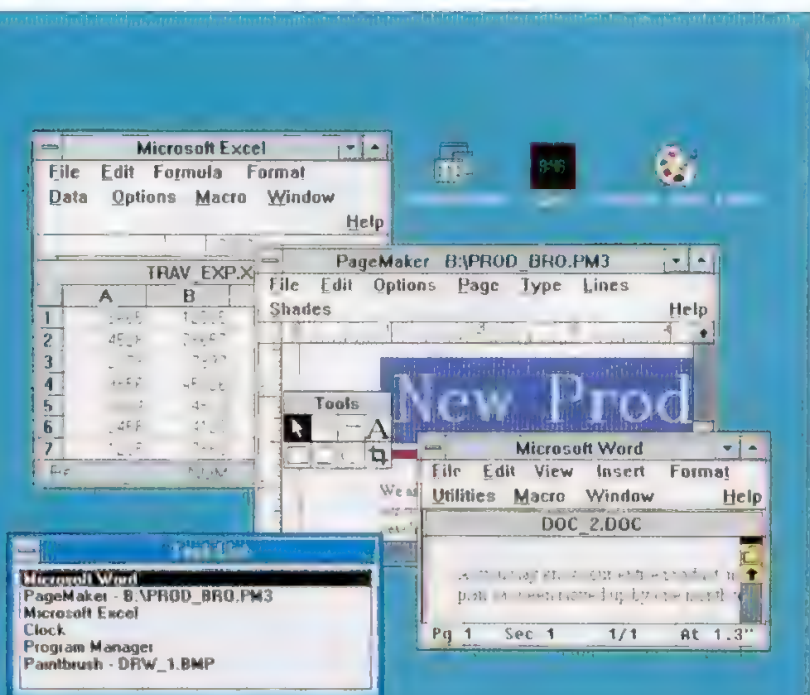
MAGICCorp will produce slides it receives by noon for overnight delivery for \$15 each, a relatively high price compared with the rest of this group. But it mitigates this expense by dramatically reducing the cost of producing additional images of the same file. For example, an additional slide of an image goes for \$3 for the same in-by-noon rate, while having a laser print made as well as the slide costs a mere \$2, compared with \$7 if it's the only output for the image. Both overhead transparencies and photographic prints take an extra day to produce but cost \$8 and \$7, respectively, when ordered with additional media of the same image—\$5 less than each costs when

ordered singly. MAGICCorp is the only one of the bureaus we reviewed to offer such a deal.

The company's communications software, *MAGIComm*, is bundled with more software than any other package—9 of the 24 PC-based software packages for which it processes graphics files—including spreadsheet, drawing, and presentation graphics packages. The service was used to produce slides for five of the presentation graphics packages we reviewed. In cases where the communications software doesn't come with the software package, as is the case with *Harvard Graphics*, you have to contact MAGICCorp to request the *MAGIComm* program and documentation before you can send files.

The packet comes with a main manual describing how to use the communications software and supplemental documentation; it also explains the particulars of the service's use with specific packages. These supplemental packets are usually quite complete, with color palette slides, margin setting information, font support information, and the like. Users are also given a "site code" to identify which software they're using once the files come into

Windows.



Adding more memory will make Windows® 3.0 really roll. And the best way to do that is with Intel Above™ Boards or Matched™ Memory 72-pin SIMMs. We have the memory solution you need to give Windows 3.0 a big performance boost. So call 1-800-538-3373 for more information. Or call 1-800-525-3019, ask for doc. #9955, and we'll fax it to you. Intel memory. Make it standard equipment for running Windows 3.0.

intel
The Computer Inside.®

the company's main office in Tarrytown, New York.

MAGIComm is a simple but complete program. It records all of the information about you (most of which needs to be entered only once), the files you're sending, and how you want them processed. It allows only 99 slides to be sent at a time, however, and it does not estimate the amount of time the transmission will take.

ON TO OHIO

Once you've succeeded in sending your files to MAGICorp's main office—either by mail-order disk or the company's 800 data line—orders designated for same-day processing and overnight delivery, MAGICorp's standard turnaround, will probably be sent along for processing to its satellite office in Wilmington, Ohio. The Ohio office is located in the same office park as Airborne, an overnight courier with whom the company has a special agreement that allows it to accept files for next-day delivery until as late as 10 P.M. This is the latest any of these bureaus can accept files, and it may be worth the \$30 per slide if you need such super-rush service.

We were very pleased with the quality

of the test slides MAGICorp produced from our *Harvard Graphics* files. Standard resolution is a very good-looking 4,000 lines, and the details of most slides were well rendered. The transparencies also looked fine, as did the slide output produced for the other presentation graphics packages. Though a blank test slide tripped up the company's Celco CFR-8000 film recorders, forcing us to resend the entire transmission, and we had trouble getting through on the phone a couple of times, we were generally very pleased with its service as well.

As it turns out, MAGICorp doesn't support gray-scale backgrounds directly. It can, however, replace any background with a gradient background created by combining any two of the 256 colors the service supports, including black to white. MAGICorp also offers a large number of special backgrounds, including a series fittingly called ShowStoppers. These gorgeous backdrops include exotic textures such as granite, marble, rosewood, and velvet, and cost an extra \$3.00 per slide.

For most users, there are good reasons

GRAPHICS

SLIDE SERVICE BUREAUS



FACT FILE

EDITORS' CHOICE

MAGICorp

777 Old Saw Mill River Rd., #220, Tarrytown, NY 10591-6727; 800-367-6244, 914-592-1244.

List Price (35-mm. slides): One-day service, overnight delivery, \$10 each. Same-day service, overnight delivery: \$15 each if received by 12 P.M., \$22.50 each if received by 6 P.M., \$30 each if received by 10 P.M. Volume discounts available.

(8 by 10 transparencies): Two-day service, overnight delivery, \$10 each. One-day service, overnight delivery, \$18 per slide if received by 12 P.M., \$27 each if received by 6 P.M.

Delivery Options: Overnight air, \$14 per shipment.

In Short: With a wide list of supported packages, good-looking output, competitive prices and excellent service, MAGICorp is the best all-around choice for most business graphics users.

CIRCLE 822 ON READER SERVICE CARD

to choose MAGICorp. The company supports many packages in their native formats; its output is truly sharp; its service is excellent; and while it's not the cheapest, it offers a good deal if you need more than one piece of output in a hurry.

3X-LINK 16 MORE THAN PRINTER SHARING

When you need :

- To Share multiple Printers with up to 16 PC's, Laptops, and PS/2s.
- To Transfer Files, and send E-Mail in background mode at 500,000 bps.
- To find the Most Flexible Topology for easy wiring.
- To choose a Low Cost, Easy to Use product.

Link 16 is the solution providing : Powerful Software. The spooler allows you to control your print queue. You can also use autoscripts to automatically transfer files and E-Mail in the background. Link 16 even has multi-level passwords for added security.

Easy Installation. Link 16 plugs right in between your parallel port and your printer cable. There's no need for an expansion slot. Link 16's daisy chain topology allows you to connect up to 400'.

Low Price and no Risk. With our 30 Day Money Back Guarantee you can try link 16 without risk. And at \$139 per workstation, there is no better value in connectivity !

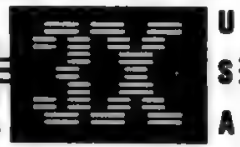
To order, call us today at 800-327-9712.



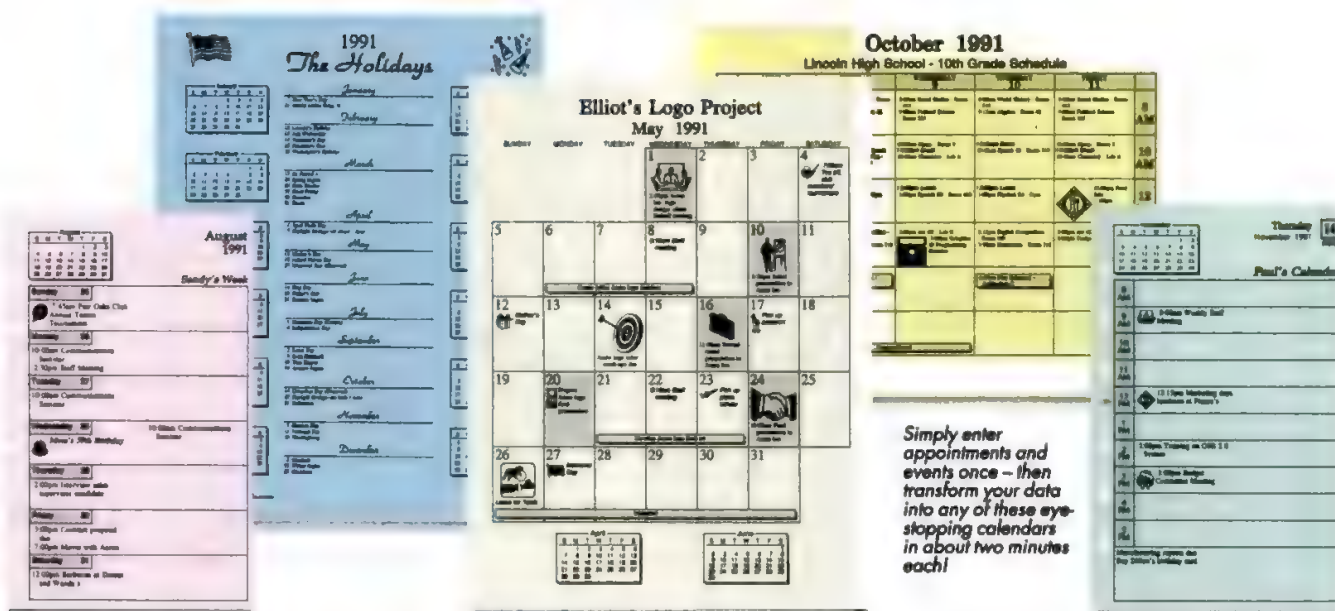
HIGH FLYING COMMUNICATIONS

3X USA Corp. One Executive Drive Fort Lee N.J. 07024
Phone : (800) 327-9712 - (201) 592-6874 - Fax : (201) 592-0908

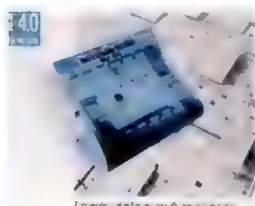
CIRCLE 234 ON READER SERVICE CARD



From chaos to calendar in five minutes flat.



Simply enter appointments and events once - then transform your data into any of these eye-stopping calendars in about two minutes each!



Calendar Creator Plus

create impressive calendars in a variety of formats! New Calendar Creator Plus™ 4.0 gives you a choice of daily, two-day, weekly, two-week, monthly, six-week, quarterly, six-month, and annual calendars. You can even print calendars to fit popular organizers like Day-Timer® and Day Runner® - automatically!

Give your calendars stopping power with scalable fonts and graphics.

Two instantly scalable fonts are at your fingertips - or you can use other popular fonts. Add drop-shadowed bars for events that span

Enter information once - then view it instantly in any of nine calendar formats. Add eye-stopping fonts and graphics...then preview your calendar in WYSIWYG before printing.

Great-looking calendars are just minutes away!

Just enter your data once - then with the press of a key

several days. For emphasis, choose from over 75 supplied clip art images or use other clip art. You can even scan in images like your company logo. Calendar Creator Plus drives your laser or dot matrix printer to its maximum resolution.

Manage schedules effortlessly.

Say your department has regularly scheduled Monday meetings. Instead of manually entering that information every week, just input it once and the meetings will automatically appear on your calendars. Or set up "floating" events like club luncheons the last Friday of every month. Create several calendars for different people or events, then merge them together into master schedules.

The amazing \$9 offer.

Now Power Up takes the risk out of buying software. Order Calendar Creator Plus today and use it free for

30 days - all you pay is a non-refundable \$9 to cover shipping, handling, and order entry. At the end of your free 30-day trial, if you aren't absolutely delighted with the program, send it back and you won't pay another

penny. Or keep the software and your credit card will be charged the \$60.95 balance (total price is \$69.95).

Requires 512K of memory, DOS 2.1 or later, and a hard disk or two floppy drives. Supports HP LaserJet, DeskJet, and most dot-matrix printers. Calendar Creator Plus is a trademark and Power Up! is a registered trademark of Power Up Software Corporation. All other trademarks are the property of their respective holders.

YES! Rush me Calendar Creator Plus.

Please bill my credit card \$9 (non-refundable, for shipping, handling and order entry). If I don't return the software in 30 days, bill my credit card for the \$70.95 balance.* (Offer good in U.S. and for credit card orders only.) Expires 6/30/91.

☐ 5.25" disk ☐ 3.5" disk

Call for details on 4.0 upgrade or Macintosh version.

Name on Credit Card (please print)

Street Address (no P.O. Box deliveries)

City/State/Zip

Credit Card Number

Exp. Date

Signature

*Residents of CA, CT, MA, NY, PA, TX, IL, WA pay sales tax on \$69.95 purchase price.

TOLL-FREE ORDER HOTLINE

1-800-851-2917 EXT. M302

(7 a.m. to 5 p.m. Pacific Time, M-F)

Delivery will be 7-10 business days from receipt of order.

Power Up Software Corporation
2929 Campus Drive, P.O. Box 7600
San Mateo, CA 94403-7600

M302

Power Up!

GRAPHICS
SLIDE SERVICE BUREAUS

Slidemasters Inc.

An extremely ambitious slide service bureau trying to establish an identity as a national force, Slidemasters is of necessity a jack of all trades. Unfortunately, it's not really a master at any of them, although for nonrush service, it's inexpensive.

Slidemasters claims it will process any graphics file it receives. Indeed, it was the only one of these slide service bureaus to attempt to produce output from every file format we inquired about. In all, Slidemasters supports 17 PC-based presentation graphics packages, including the packages for which it is the official slide service bureau—Micrografx' *Designer*, *Draw*, and *Graph Plus*, which it supports through the *Telegrafx* driver that is a part of these packages.

We were warned that the price would be high for nonstandard formats, however, and when the files it receives lean toward the exotic, Slidemasters' prices do become expensive. For example, *PowerPoint* for PCs is not yet on Slidemasters' list of standard supported packages, though the

Macintosh version of the product is. For this reason, Slidemasters charged us a \$35 "rush" price for each PC *PowerPoint* slide we sent in the afternoon (they were received between noon and 3 P.M.) to be produced for next-day delivery, as well as for a half-hour's worth of file manipulation at \$150 an hour. EPS images are in the company's standard repertoire, but, like *Windows* files, cost more because of the difficulties that can be entailed in producing them. The fee charged for producing an EPS file received by noon CST is \$25 per slide.

Compared with those of its peers, Slidemasters' prices start out high. If files are received by noon, the company charges \$18 per slide to produce files for next-day courier delivery from *Harvard Graphics* and other DOS-based packages. The company charges more to produce output from *Windows*-based packages because, it says, they take longer to process: \$20 each if the files are received by noon. The prices are a more competitive \$12 and \$15, respectively, if you can get them into Slidemasters' office by 10 A.M. CST. The



FACT FILE

Slidemasters Inc.

1100 Business Pkwy., Richardson, TX 75081;
800-969-8228, 214-437-0542.

List Price (35-mm. slides): Two-day service: DOS applications, \$6 each; *Windows* applications, \$9 each. One-day service: DOS applications, \$9 each; *Windows* applications, \$12 each. Same-day service, DOS applications, \$12 each if received by 10 A.M., \$18 each if received by 12 P.M., \$25 each if received by 5 P.M.; *Windows* applications: \$15 each if received by 10 A.M., \$20 each if received by 12 P.M., \$30 each if received by 5 P.M.

(8 by 10 transparencies): Cibacopies: Two-day service, \$9 each; one-day service, \$18 each. Canon Laser overheads: Two-day service, \$5 each, one-day service, \$10 each.

Delivery Options: Overnight air, \$22.50 per shipment if received between 8 A.M. and 3 P.M.; \$60 per shipment if received between 3 P.M. and 5 P.M.; \$160 per shipment if received between 5 P.M. and 12 A.M.; second-day air not available.

In Short: This ambitious service provides a plethora of options, including PostScript support. However, its willingness to handle just about any format doesn't guarantee good results, and its initially low prices can skyrocket when tighter turnarounds and uncommon software are requested.

CIRCLE 623 ON READER SERVICE CARD

Introducing Pocket Edition™ 2400

The people who wrote the book on modems proudly present the Pocket Edition. The first Hayes modem specially designed for people who use laptop and notebook computers.

The people who wrote the book on modems proudly present the Pocket Edition.

Weighing in at a slight three ounces, the Pocket Edition 2400 comes with everything you need to take it on the road—a 9-pin connector, cables, a handy carrying case, and our simple-to-use Hayes Smartcom EZ communications software.

And, because it gets all its power from the

phone line and your computer's serial port, you'll never find yourself searching for an outlet to plug it into.

The Pocket Edition is incredibly compact, yet it contains many of the features you expect from our "full-size" Hayes modems. It's ideal for working remotely with your

Once again, Hayes has set modems will



GRAPHICS SLIDE SERVICE BUREAUS

best deal comes from the company's standard one-day and two-day economy turnarounds, which bring the DOS processing price down to \$9 and \$6.

THE HIGH PRICE OF MEDIOCRITY

Though we paid dearly for it, we were not completely satisfied with the first set of slides that Slidemasters produced for us using its Management Graphics Solitaire recorders. None of the problems were major—one of the typefaces in a slide with two different styles dropped out, for example, and the company had a problem with EPS images. And to Slidemasters' credit, it remedied most of these problems. Even so, the experience was troubling. The test slides that Slidemasters produced at its standard 4,000-line resolution just didn't look as good as those produced by Geniographics, Kinetic, or MAGICorp. Slidemasters had trouble with imported graphics, and the gradients showed noticeable vignetting.

The overhead transparencies that Slidemasters produced for us were more satisfactory. These are Cibacopies made by blowing up a 35-mm. slide with the Ilford machinery that most of these service bu-

reaus use; they cost \$18 for same-day courier delivery. The company also offers higher-quality Ektachrome overhead transparencies made from the Solitaire recorder at 8,000-line resolution with E6 film and lower-quality overheads made using a Canon CLC 500 color laser copier. The latter are priced accordingly, and, like those from other companies, they are priced more reasonably for two- or three-day turnaround schedules. In addition to slides and overhead transparencies, Slidemasters can create 4 by 5 transparencies, color laser copies, and poster-sized output.

BUILT-IN BULLETIN BOARD

If you use Slidemasters with Micrografx packages, you can use that package's Telegrafx utility. Instead of a custom communications link, Slidemasters uses a bulletin board that can be called up with any communications package as a means of receiving files other than those produced with Micrografx products. The bulletin board is accessed through an 800 number and supports five transfer protocols, including Xmodem, Ymodem, and Zmodem. You

must compress your files first in some way in order to send them (Slidemasters will send you a copy of PKZIP if you request it).

Though this bulletin board system is more flexible than a dedicated communications package, its primitive interface (which even contains spelling errors) makes it harder to use. It doesn't allow you to specify the type of output you'd like to produce for each slide you're sending; nor does it estimate how long your transmission will take. It also doesn't create a record of your transmission for you (which became a problem when files were temporarily lost by Slidemasters). Most of our testing occurred during a period when Slidemasters was moving to larger facilities, however, and this may account for some of the service problems we experienced.

Slidemasters is commendable for its ambition to process the widest variety of files. And if you're willing to wait an extra day or two, its prices are very competitive. But problems with slide quality and the bulletin board system of communicating make this service difficult to recommend. ■

company's computer system. It keeps you in touch with electronic mail. You can even use it to deliver a FAX with an on-line service.

And while the Pocket Edition was created for people on the go, it's also a great space-saver for those who stay at home.

At the suggested retail price of \$179

(and with our unique Hayes performance warranty and money-back guarantee), you'll find the Pocket Edition extremely easy on your pocketbook.

For more information about the new portable Pocket Edition 2400, call us at 1-800-635-1225.

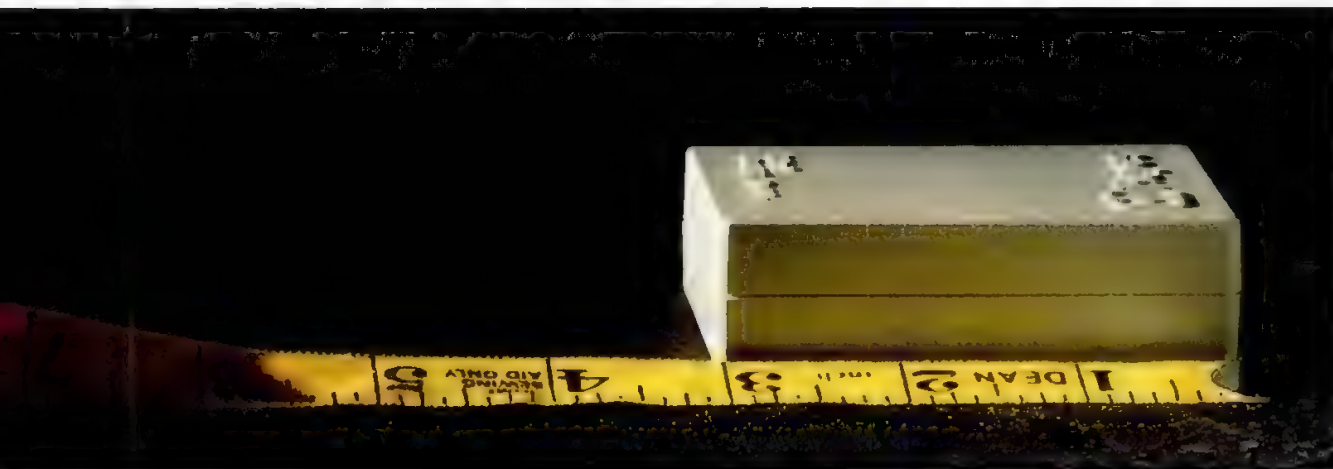
It's time you gave your laptop a new traveling companion.

Hayes®

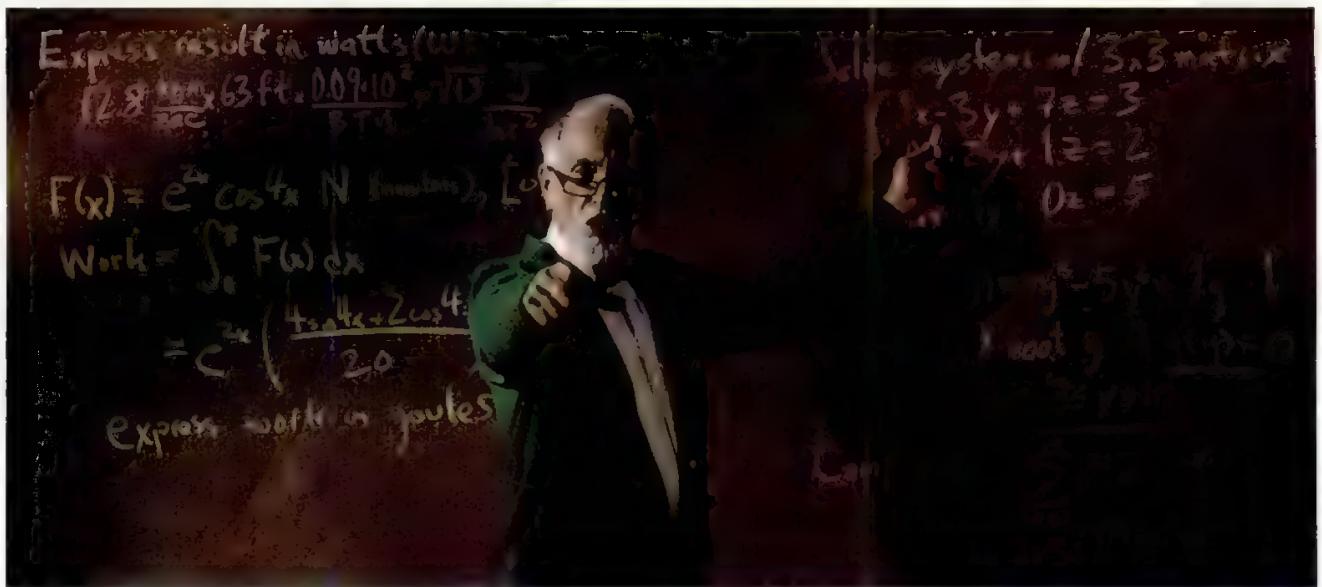
Our technology has the computer world talking.
More than ever.

the standard by which all be measured.

CIRCLE 136 ON READER SERVICE CARD



In college, you would have killed for MathCAD. So why aren't you calculating with it now?



100,000 engineers and scientists already let MathCAD do their calculations for them.

Now that college is far behind you, perhaps it's time you graduated from spreadsheets, calculators and programming.

Because in today's working world of engineering and science, there's no time for anything less than MathCAD. The software that lets you perform engineering and scientific calculations in a way that's faster, more natural, and less error-prone than any calculator, spreadsheet, or program you could

write yourself.

Thanks to MathCAD's live document interface, you can enter equations anywhere on the screen, add text to support your work, and graph the results.



March 14,
1989 issue.
Best of '88
Best of '87

It also comes complete with over 120 commonly used functions built right in. Perfect for creating complex equations and

formulas, as well as exponentials, differentials, cubic splines, FFTs and matrices.

You get three-dimensional plotting, vivid graphing, and the ability to import HPGL files from most popular CAD programs, including AutoCAD®.

Done calculating? MathCAD prints *all* your analyses in presentation-quality documents, even on PostScript® compatible printers.

All of which has made MathCAD far and away the best-selling math software in the world. In fact, it's used by over 100,000 engineers and scientists — just like you.

There's MathCAD for the PC. MathCAD for the Mac, written to

take full advantage of the Macintosh® interface. And a Unix® version that utilizes the speed and unlimited memory of your Unix workstation.

We also have Applications Packs for Advanced Math, Statistics, Mechanical, Chemical, and Electrical Engineering. Each is a collection of adaptable mathematical models, designed to let you start solving your real world problems right away.

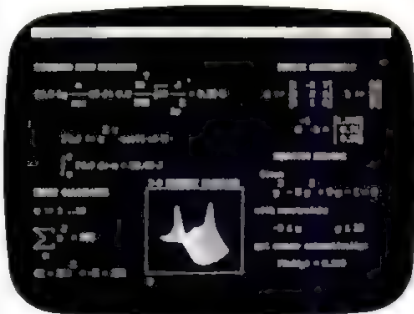
For a free MathCAD demo disk, or upgrade information, dial 1-800-MATHCAD (in MA, 617-577-1017). Or see your software dealer.

Available for IBM® compatibles, Macintosh computers, and Unix workstations. TM and ® signify manufacturer's trademark or registered trademark, respectively.

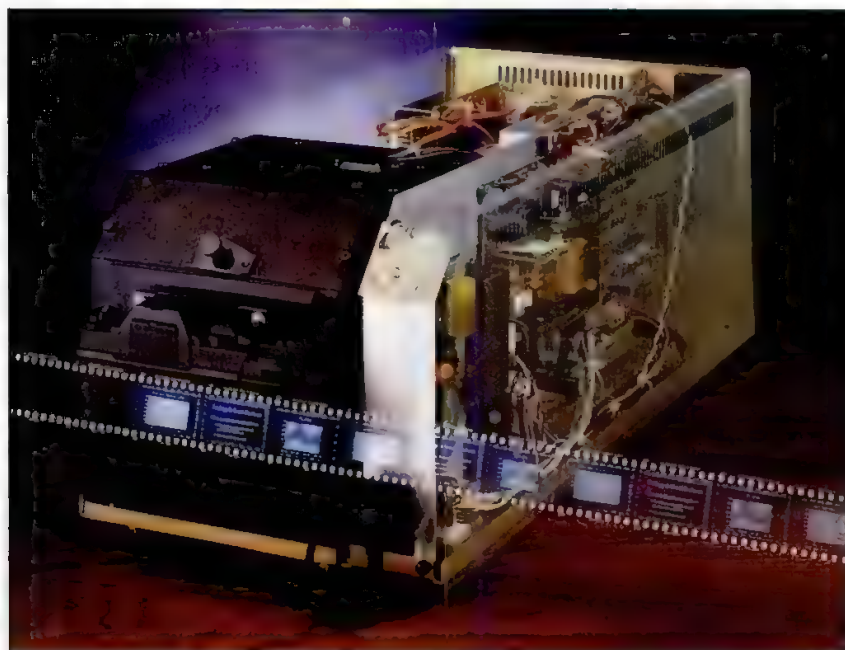
1-800-MATHCAD

MathCAD®

MathSoft, Inc., 201 Broadway, Cambridge, MA 02139



MathCAD 2.5 includes 3-D plotting, HPGL sketch import, and PostScript output.



Film Recorders

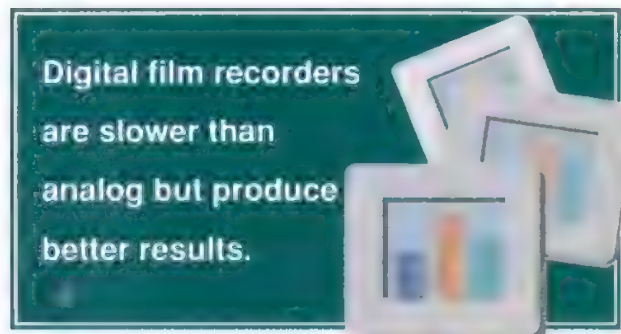
by Alfred Poor

Looking for more control over your slides than an outside service can give you? Check out one of these four desktop film recorders. They use the same technology as the professional models, but with prices between \$4,500 and \$9,000, they are affordable on the desktop.

Film recorders, which process computer images and record them on film, are traditionally of interest only to specialized slide service bureaus. Professional film recorders cost upwards of \$40,000, and a capital expenditure this large can usually be justified only if the recorders can be rented out on a production basis. Less expensive recorders are available (in the \$10,000 to \$25,000 range), and some large organizations have found it cost-effective to acquire them. But since these machines are still expensive and require significant skill to operate, they are usually found in corporate graphics departments that function essentially as internal slide services, with a dedicated staff to meet the needs of the whole company.

The service-bureau approach works well for some, but many people don't like to rely on outsiders to create their slides. First, there's the problem of lead time. Just because you need slides tomorrow does not mean that a service will be able to create them in time for you, and if you need a quick slide proof, you're out of luck.

Then there's the security issue. If your sensitive quarterly results or comps must pass through the hands of strangers, there is always the chance that something might



leak somewhere; the best way to guard secrets is to keep them to yourself.

Finally, there's the confidence factor. If your performance is going to be judged on the results, you may feel more comfortable having the entire process right at hand, where you can see its progress and know that the results will be ready when you need them.

All of these considerations make it desirable to have slide imaging capabilities right at your desktop. And manufacturers have responded to this need by producing less expensive film recorders suitable for the purpose. Though these desktop film recorders aren't for everyone, they are inexpensive enough for those who really need them to have such units all to themselves.

REVIEW CRITERIA

In this review, we look at four film recorders suitable for the desktop market. All are technologically similar to the more expensive cousins used by slide service bureaus; they use digital technology and support a resolution of at least 2,000 lines with up to 16.7 million simultaneous colors on any image. All of them have list prices under \$9,000, including the PC interface.

Agfa Matrix Division's Agfa ProColor, Lasergraphics' LFR, and Presentation Technologies' Montage FR1 were all reviewed in our previous look at film

recorders ("From Screen to Slide—Affordably," *PC Magazine*, February 28, 1989), though they have new options and new software in some cases. There's also a newcomer, Polaroid Corp.'s Polaroid Digital Palette CI-3000, a digital counterpart to the popular analog Polaroid Palette (which we mentioned in First Looks, January 29, 1991).

A few other models exist in this category. The Mirus FilmPrinter and the Forefront Graphics F2FR both fit our criteria for review, but the vendor of the former could not supply us with an evaluation unit in time, and we were unable to complete our tests on the latter because final versions of the necessary drivers were not available at the time of shipping. The PhotoMetric SlideMaker from Gener-

al Parametrics Corp. has a price tag in this range, but it does not support 16.7 million simultaneous colors.

THE BENEFITS OF BEING DIGITAL

The earliest low-cost film recorders, like the original Polaroid Palette, were analog recorders. These work by taking a video signal directly from the computer and displaying it on a small CRT contained in a case; a camera then takes a picture of this full-color image. The approach is fast and cheap, and it creates good enough images for proofing and for relatively undemanding applications. But since the image is created by the video adapter in your PC, its resolution and number of colors are limited to those the signal can supply: If you use a VGA adapter, then 640 by 480 pixels by 16 colors is all you'll get. High-quality analog recorders exist, notably Focus Graphics' ImageCorder, which is designed primarily for rapid imaging of CAD drawings. But business-quality slides require digital technology.

Digital film recorders also have a CRT and a camera, but they work very differently from their analog cousins (see the sidebar "From Screen to Screen: How a Film Recorder Works"). Instead of putting up a full-color image and snapping its picture, a digital recorder exposes the red, green, and blue components of the image separately through colored filters. This process is slower, but since the resolution

depends on the recorder's own rasterizer rather than your video card, the results are of much higher quality than you can get from an analog system.

Once the image is on film, it is treated much like any other photograph. If the camera body (called the *camera back*) is a standard 35-mm. model, you simply send the film away to be developed into color prints or slides. If it's an instant-camera back, you can develop and mount the slides yourself using standard film cutting and mounting equipment.

SPECS AND SPECS

In practice, the only way to determine whether you are likely to get quality slides is to run a few and see them for yourself. But it's important to know about some basic technical issues so that you can understand what affects quality.

The traditional resolution for 35-mm. slides has 4,000 lines, or 4,096 by 2,732 pixels; this is known as 4K resolution. All recorders we reviewed except the Polaroid Digital Palette CI-3000 support 4K resolution. It represents the finest resolution that the light-sensitive particles on standard 35-mm. film can achieve.

Sometimes you will want the highest possible resolution (for formal presentations in large auditoriums, for instance, where any blemishes will be blown up to wall size). Yet 2,000 lines (2,048 by 1,366 pixels) is plenty for many situations. Though jaggies and artifacts are more noticeable at this lower resolution if you look closely, they are subtle enough to be ignored if your audience isn't sitting too close to the screen. And 2,000-line slides are a good deal faster to create than 4,000-line slides. All the recorders in this group have 2,000-line modes, and in the Polaroid recorder this is the highest resolution available.

2,000- or 4,000-line resolution isn't necessarily a measure of the sharpness of the slides, though. This *addressable resolution* is only the number of pixels that the recorder can define in its controller; the actual number of dots that can be exposed on the film (the *resolvable resolution*) may be smaller, depending on the spot size and other characteristics of the internal CRT. If the resolvable resolution is too much lower than the addressable resolution, the image tends to look fuzzy, as the large spots overlap and obscure each other. Yet the spots must overlap somewhat to produce a continuous image.

A film recorder's color-handling abil-

You're always ready to present with the Digital Palette Color Film Recorders from Polaroid.

Now you can turn your great ideas into high quality presentations instantly with the Digital Palette Color Film Recorders from Polaroid. In fact, you can make top quality, full color 35mm slides, prints and overhead transparencies right from your PC in just minutes. And because you're creating presentations at your desk, you save money on outside vendors. And of course, only Polaroid's Color Film Recorders come with a two year warranty, the longest in the industry.

The CI-3000 and CI-5000 are compatible with leading software packages including Polaroid's Presentation Express, Lotus Freelance and Harvard Graphics. For a free information kit, fill out the coupon or call 1-800-225-1618. And start turning your best ideas into reality right away.

**This morning,
this entire presentation
was just a scribble.**

Get up to \$320 worth of presentation accessories
FREE with purchase by 6/30/91.

- ☐ Please send free information.
☐ Please contact me to arrange a demonstration.

Name _____

Title _____

Organization _____

Address _____

City _____ State _____ Zip _____

Phone number () _____

PC make and model _____ M/C581

Mail to: Polaroid Corp., Box 5011, Clifton, NJ 07015

Nothing Works Like

Polaroid

Instant Presentation Solutions

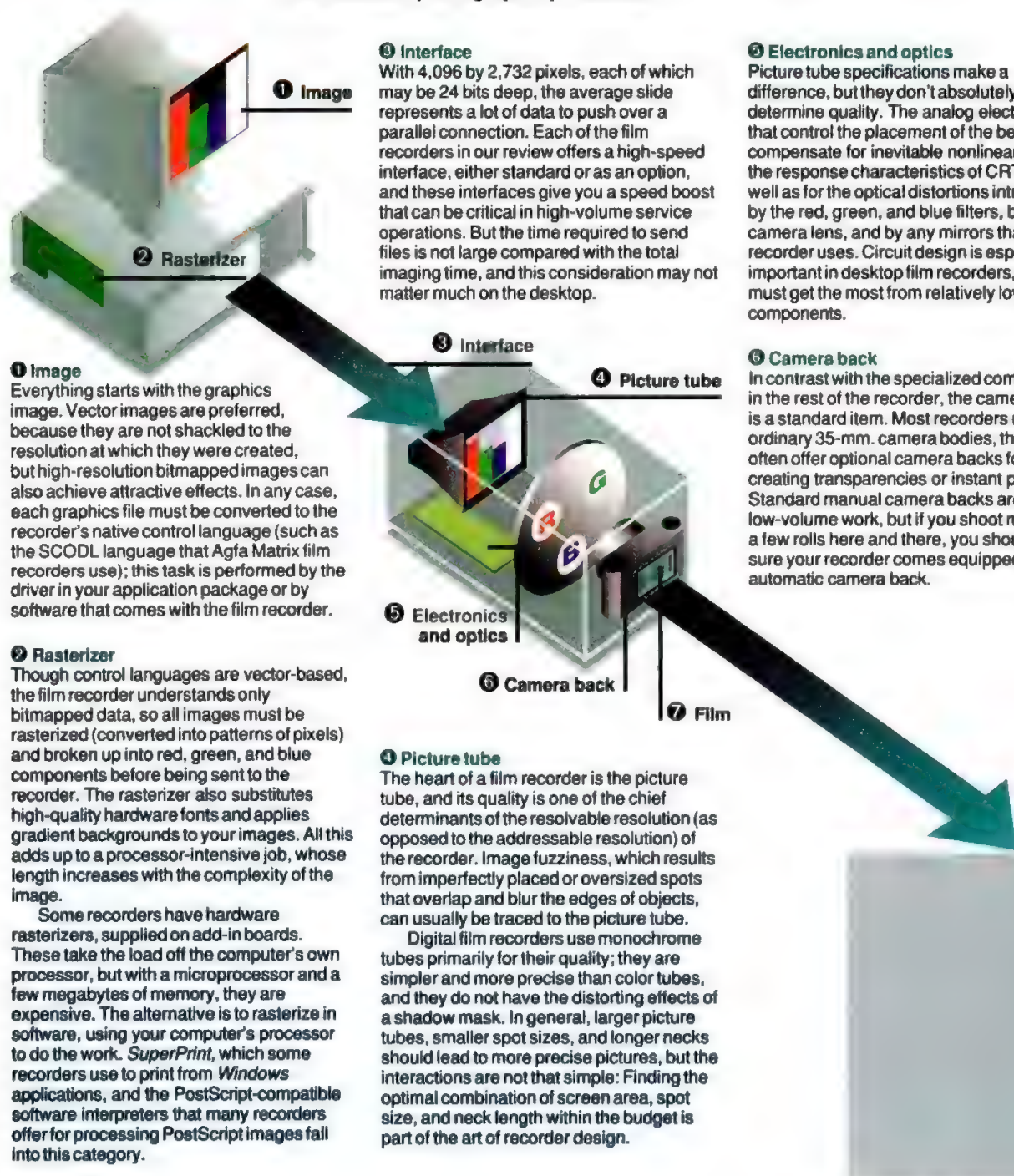
CIRCLE 222 ON READER SERVICE CARD





FROM SCREEN TO SCREEN: HOW A FILM RECORDER WORKS

Digital film recorders create images through triple exposure. After the image is rasterized, its red, green, and blue components are displayed line by line on a monochrome CRT, passing through a filter of the appropriate color before striking the film. The result is a full-color image that can then be developed and printed by conventional photographic processes.



GRAPHICS

FILM RECORDERS

① Film

One of the trickiest aspects of using a film recorder is choosing the proper film. Different types of film have different responses to light, with some being more sensitive to blues and some to reds, and one of the most critical parts of film recorder engineering is the development of the color lookup tables that map software RGB values to red, green, and blue beam intensities. Each table must be carefully calibrated to the optical qualities of the type of film you are using; imperfections in this software can result in banding, vignetting, or color distortions.

Many people use general-purpose film such as Ektachrome 100 for creating slides, but most film recorder vendors recommend one or more types of professional-quality film. These are more tightly controlled in the manufacturing process and consequently respond more uniformly to exposure and development. In either case, you should try to shoot all the slides in a presentation from the same emulsion batch to minimize color variations.

② Developer

Unlike a color printer, a film recorder's output is not ready to go once the light stops blinking; you need to have the film roll developed first. Development has its own impact; the best film and the best recorder cannot compensate for variations in chemicals and photographic processes. In our tests, we went to the source, Kodak, to develop our slides. In practice, you will find it worthwhile to work with your developer to get slides of the greatest consistency.

You can avoid the outside development step by using Polaroid Polachrome 35-mm. instant slide film, which fits inside an ordinary 35-mm. canister and can be developed within a few minutes by using a special unit. You can produce instant transparencies as well, with the proper camera back. The quality of these instant images is noticeably lower than you would get from conventional film, however.

③ Projector

No matter how much care you take to produce the finest slides, it can all go to naught unless you take equal care in the projection room. A slide will look much clearer on a high-quality projector with a precision-ground glass lens than on a cheaper one with a plastic lens. The heat from the projector can cause the acetate to expand and the image to slip out of focus; glass mounting can help prevent this. The reflectivity of the screen influences perceived brightness and color, as does the ambient lighting.



④ Projector



ity is also important. All these recorders support full 24-bit color, which assigns 8 bits per pixel for each of the red, green, and blue (RGB) components, for a total of 16.7 million colors. This is more than enough colors for any image; in fact, it's more than the human eye can see. But problems can still arise due to differences between the ways film and the eye perceive color. These are most apparent in gradients—tints that gradually shift from color to color—which look so attractive in slide backgrounds. Depending on the quality of the color lookup tables that map RGB values to film colors, you may see noticeable banding and abrupt transitions.

One way of smoothing out gradients is to increase the number of resolvable colors by representing each one with 33 bits instead of 24 bits (11 bits each for red, blue, and green). Though this does not increase the actual number of addressable colors, it does offer more steps within each color for gradients. Some relatively high-end recorders, such as Lasergraphics' LFR Plus, use this feature. In our group, the Polaroid Digital Palette CI-3000 employs this technology.

In addition to applying gradient backgrounds, film recorders also offer several hardware fonts for rendering text. The advent of high-quality scalable fonts in business graphics packages makes these less important, but older packages such as *Harvard Graphics* still rely on the fonts built into the recorder. Since most presentations rely heavily on word charts, having a variety of good-quality hardware fonts is crucial.

BILL OF OPERATIONS

The above considerations are important in selecting a recorder, but what matters in using one is the accessories: the software that the manufacturer supplies to adjust and control the recorder, and the various camera backs.

The traditional way to get your images into a film recorder is to write the output to a file and then copy it to the recorder. But this is a crude method, so most recorders today come with software that lets you group images in groups of 36—the number of frames in a standard film roll—and send them to the recorder in a batch. Some software, such as Polaroid's ImagePrint, lets you print images in standard graphics file formats. Vector formats such as CGM or HPGL are the best for this purpose, as they can print at the high resolutions that film recorders support without degrada-

Impress yourself.



(This impression courtesy of Microsoft Excel and Word for Windows.)



er, you will not only get excited about your work, but a lot of other people will get excited about the work you do.

You see, Microsoft Windows applications make it possible to do incredible things

When you combine Microsoft Windows™ applications with any Hewlett-Packard® LaserJet™ III print-

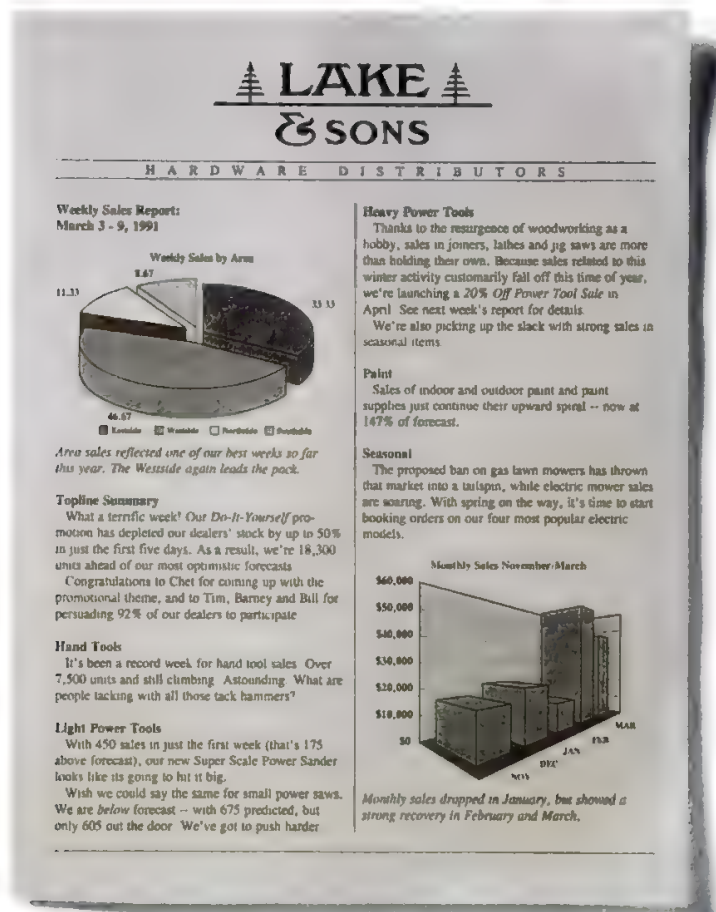
on-screen, while the HP® LaserJet III family lets you print them in all their glory.

This is possible, in part, because Microsoft Windows applications make it easy to format text, data and graphics in a completely WYSIWYG way.

But also because the HP LaserJet III

Microsoft®
Making it all make sense®

And everybody else.



(This impression courtesy of the Hewlett-Packard LaserJet III printer.)



The Hewlett-Packard LaserJet III family of printers. The perfect companion to Microsoft Windows applications.

comes with scalable fonts supported by our Windows applications. So you get thousands of font choices. As well as the ability to print in record speed. And to ensure that you get crisp, clear out-

put, HP developed a new technology they call Resolution Enhancement. But you'll call it simply amazing.

To learn more about how Microsoft Windows applications and the HP LaserJet III family uniquely work together, call (800) 541-1261, Department. Q18.

We think you'll be impressed.



**HEWLETT
PACKARD**

EVERY LITTLE BIT HELPS: Color Theory for Film Recorders

by Lori Grunin

Most of us are a bit out of our depth when it comes to color. Though a growing number of PC literati understand that a 24-bit color space can encode over 16.7 million distinct colors—far more colors than the human eye can distinguish—explaining exactly why you need all those colors is not so straightforward. To understand how film recorders use all these bits, you have to venture into the territory of color theory.

For many of us, our first brush with color theory comes in the form of an introduction to the visible spectrum—the wavelengths between 380 and 770 nanometers (nm.) that stimulate the rod- and cone-shaped photoreceptors in the human eye. Rods and cones are sensitive to a variety of wavelengths, but each type is most sensitive to a certain range. For instance, receptors that are sensitive to light waves in the range of 490 to 540 nm. will absorb those waves, reflect some others, absorb some others, and generate a sensation we call “green.”

Right away we spot the first problem: Color is defined by what people see, rather than by a simple, objective measure such as the wavelength of the light waves in question. This is true for two reasons. First, colors can be generated by mixtures of wavelengths, as well as pure wavelengths. Yellow light, for instance, has a wavelength of 550 nm., but combining green and red light also produces the sensation of yellow. Different combinations of waves that produce the same colors are called *metamers* of each other.

Second, ambient light plays a crucial role in the perception of color. The combination of wavelengths in sunlight, for instance, varies throughout the course of the day. When the light in which you view an object combines with the light reflected off that object, the color you perceive is a mixture of the two. With emitted color such as that of a projected slide, colors can vary from projector to projector. For

the same reason, it is difficult to match the colors on your CRT (whose excited phosphors emit one set of wavelengths) with those of your film recorder (whose CRT/filter combination emits another set of wavelengths).

IN THE EYE OF THE BEHOLDER

Because of these two factors, judging the colors of different slides can become troublesome. No color looks exactly the same to two different people; in fact, the same slide appears different to the same person under different viewing conditions. You can use a densitometer to measure color intensity, but such instruments cannot sense metamers, so they can't tell you whether two colors are visually equivalent. Moreover, because we perceive light waves from surrounding objects at the same time we perceive the object of interest, a color can look different depending upon the colors of its neighbors.

All of this brings us to a key concept in the true-color world, that of *visual uniformity*. A color space (or *gamut*) comprises all possible colors available for a given output device. The color space is considered visually uniform when mathematically equal shifts in hue induce equally perceptible changes in color sensation. Humans are most sensitive to light waves in the middle-length (yellow-green) range, so we detect small changes in shades of green more easily than changes of the same magnitude in, say, blues or reds.

Film emulsion is designed to be visually uniform. Color CRTs, however, are a different story. Digital color is created by combining various proportions of red, green, and blue. A 24-bit palette has 8 bits per color, and the computer generates all possible combinations of integer values from 0 to 255 for each of the three primary colors. But these are purely mathematical combinations, which take no account of the variability of the human perceptive apparatus. We probably won't be able to see any difference between

many of the reds, but we can perceive relatively significant differences between some of the greens.

Thus, while the 24-bit digital palette of 16.7 million colors can theoretically encode all the colors we can view, color mixing can be frustrating, because adding equal amounts of red to different colors has different effects. The same phenomenon poses problems when creating images for output to visually uniform media such as film, which tend to be more sensitive in either the red or the blue end of the spectrum.

PUTTING IT ALL TOGETHER

A film recorder deals with these problems by means of color lookup tables (CLUTs), which work in conjunction with the unit's digital-to-analog converter (DAC). The two work together to map the colors your computer generates to the colors that your recorder can generate. These tables adjust the film recorder's response for different types of film and also partially compensate for the visual nonuniformity of digital color, by compressing various sections of the spectrum so that more colors map to green than either red or blue. Unfortunately, a 24-bit film recorder can map 8 bits of input to at most 8 bits of output. When the recorder bunches colors up in some parts of the spectrum and spreads them out in other parts, the mapping function becomes stairstepped, and the end result is banding on what should really be smooth gradients.

To get around this problem, some recorders (notably the Polaroid Digital Palette CI-3000 in our review, and Lasergraphics' LFR Plus) increase the number of output bits to 11 per color, or 33 bits total, allowing the recorder to produce 1,024 exposure levels, so you don't have to sacrifice hues for brightness levels. Though you can still address only 8 bits per color, the mapping function remains smooth, the banding is eliminated, and the result is smooth gradient fills. ■

This is what the
world's most powerful 486
system looks like.



Cylindrical pin and tumbler locks keep unauthorized fingers out of the hardware. (And your data is equally safe, because we've built password protection into the firmware.)

ETMS: Everex Thermal Management System, makes this the first system to solve the high temperature and related reliability problems of current and future processors. A partition separates the cube into two compartments, independently cooled by SmartFans. One contains the CPU, one the drives. Baffles funnel cool air where it's most needed. Even the power supply is cool, because at 400 watts, it runs at a fraction of its capacity.

Removable motherboard for instant upgrades, which we'll bring you as new technologies emerge.

All the full-length expansion slots you'll ever need—12 altogether, including 10 EISA slots.

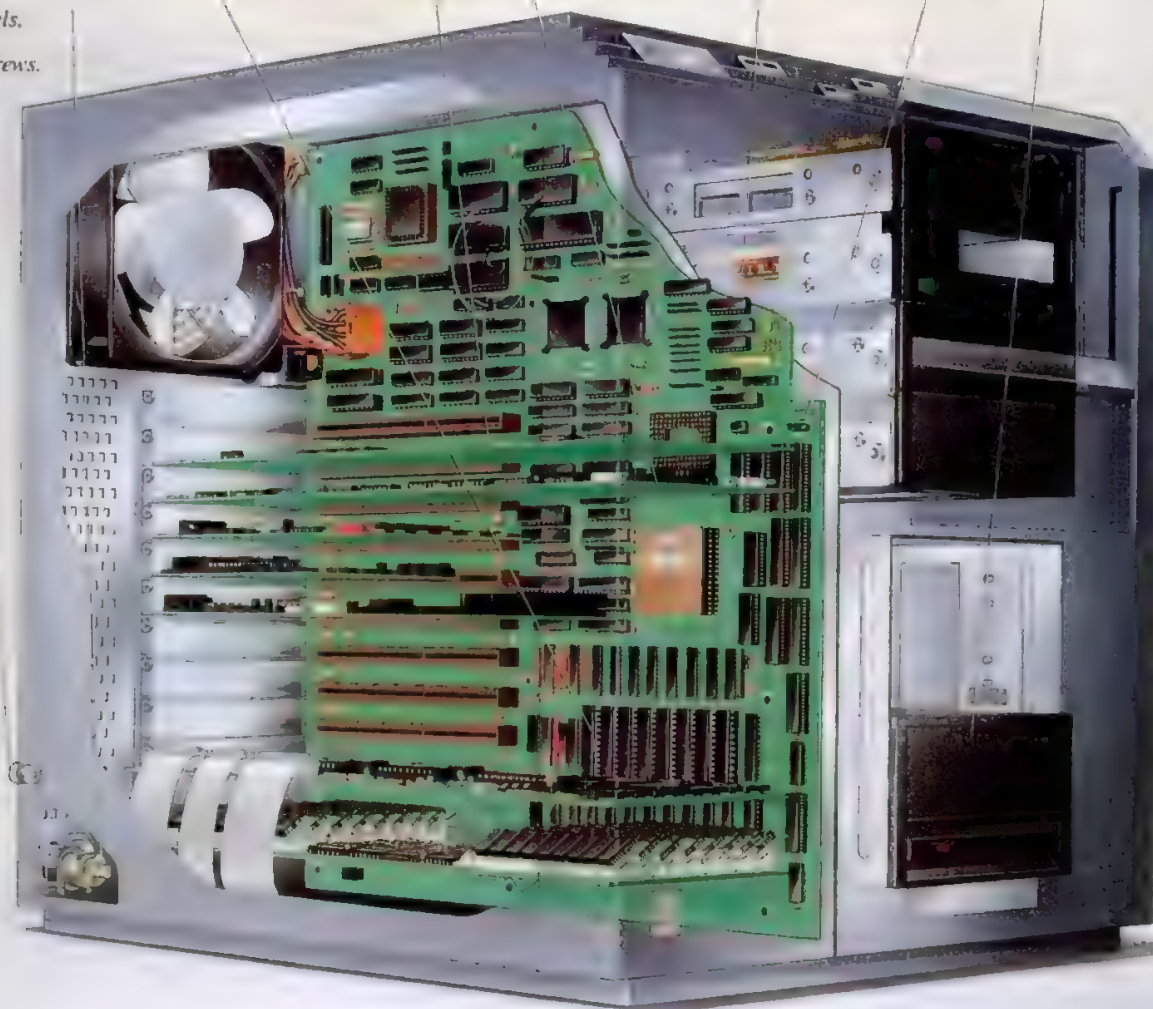
AMMA, a 256KB write-back caching architecture, forming "two-tier" caching in combination with the 486 chip's 8KB internal cache. It improves the cache hit ratio from 90% to as much as 99%.

Space for four quick release, half-height drives. They're front accessible, behind a hydraulically dampened door—which makes sure your drive heads are reading disks and tapes, not dust, smoke and humidity.

The entire interior of the cube is accessible in seconds through side panels, using thumbscrews.

The 486/33 CPU chip, Intel's hottest. But when hotter chips come around, the cube will be cool enough to handle them. And that includes multiprocessors.

Quick release drive bays accommodate up to eight more drives that can be swapped out in less than five minutes.



And this is why.

Conventional system design can't cope anymore. The emerging technology is just too hot for it.

Enter the STEP Megacube.[™] Redesigned from the ground up, the STEP Megacube is a 486[™] system unlike any other. It incorporates ideas from the mainframe world, such as its caching architecture and thermal management. And it has performance and features that make it a perfect fileserver. Or a perfect multiuser system. Or a perfect graphics workstation.

A 486/33 CPU combined with Everex's proprietary Advanced Memory Management Architecture (AMMA[™]) gives it warp speed—21.7 MIPS. Space for twelve drives gives it storage that will remind you of the Library of Congress. And twelve expansion slots give it more expandability than you can shake a peripheral at.

And if it happens to be an Everex[™] peripheral, you could get a nice performance bonus. Because Everex graphics, networking and controller boards are designed to take full advantage of our STEP[™] architecture for even better performance.

Combine all this with up to 64 MB of RAM—enough for the most demanding applications—and you wind up with a computer that can be configured for anything.

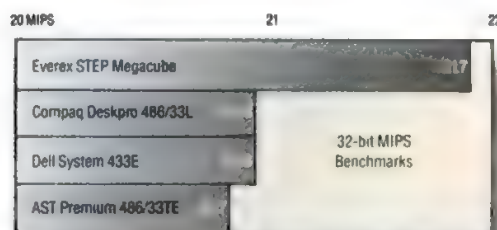
Even the future.

You see, the design breakthroughs of

the STEP Megacube eliminate the upgradability problems inherent in other systems. Which means that when the next generation processors arrive—like the 50MHz 486, just down the road—all you have to do is swap out motherboards. No space problems. No overheating problems.

No obsolescence.

Performance-wise, this is a machine that will be hot long after others are cold and buried. In fact, as of now, there's no end in sight to the STEP Megacube's upgradability path.



But really, that shouldn't be much of a surprise. After all, at Everex, our mandate is "Always innovate, never compromise." And that's exactly the approach we took when we built the STEP Megacube.

Granted it doesn't look like your typical 486 system. Fortunately, it doesn't perform like one either. To find out more about what it can do, give us a call.

For a free copy of the STEP Megacube Application Guide, call:

1-800-258-STEP

Introducing the STEP Megacube.



CIRCLE 113 ON READER SERVICE CARD

*Inquiries from outside the U.S. call 415-496-1111, in Canada, 1-800-663-5864. Government Services Administration #G500K90AG55253. EVER for EXcellence is a registered trademark and Everex, STEP, Megacube, ETMS and AMMA are trademarks of Everex Systems. 486 is a trademark of Intel Corp. SmartPen is a trademark of NMB Technologies, Inc. Benchmark results from Intelligent Devices Corporation's HighTest Benchmarking Software. For more information on how they were derived, write the Everex Performance Test Center, 48431 Milmont Dr., Fremont, CA 94538 © 1994 Everex Systems, Inc.

tion. But often you can print high-resolution bitmapped images as well. The most popular bitmapped formats are TIFF and Targa's .TGA format; unlike, say, .PCX, these support full 24-bit color.

These batch-printing schemes work well enough, but it is usually easiest to print your images directly from your graphics program. Many film recorders now have direct drivers for such popular graphics applications as *Harvard Graphics* and *Lotus Freelance Plus*. And with the recent popularity of *Microsoft Windows 3.0*, most vendors are actively working on *Windows* drivers, which opens up their recorders to a whole world of *Windows*-based graphics software. Presentation Technologies and Polaroid even offer custom versions of *Zenographics*.

SuperPrint, which not only let you print from any *Windows* application but also vastly extend the recorder's text capabilities by letting you use any industry-standard scalable font outlines. Unfortunately, none of the recorders had *Windows* drivers available in final form when we tested.

While PostScript has become the overwhelming favorite imaging model for color publications, it has not yet taken over the film recorder world. All but the Polaroid recorder were offering PostScript options at the time of our review, but these come in the form of add-ons: Lasergraphics and Presentation Technologies offer versions of the PostScript-compatible software interpreter *Freedom of Press*,

while Agfa offers an expensive hardware solution in the Chromascript. This retrograde situation may be changing, if new products are any guide: The Forefront F2FR, for example, is designed specifically for imaging PostScript slides.

THE MECHANICAL EYE

Photography can be a complex subject, but the camera and film needed for desktop film recorders are fairly simple. The standard camera back on most film recorders is an ordinary 35-mm. camera from Canon or Pentax—just like the one you would buy in a camera store. It operates just like an ordinary camera, too, so it should not be hard to master if you have any experience with photography. The Lasergraphics and Polaroid offer optional backs to create 4- by 5-inch transparencies, and the latter even has an 8- by 10-inch transparency back, though most people will want to go to a service bureau for the use of this expensive specialty item.

Most camera backs are self-loading and offer automatic advance, but if you regularly shoot more than a roll or so at a time, you'll appreciate an automatic camera back like the one available with Lasergraphics' LFR. This clever machine winds to the end on loading so that it can count frames, and it has a liquid crystal display that gives you status messages in English rather than gobbledygook. Such state-of-the-art features can really simplify the operation of the recorder.

Though film recorder manufacturers recommend professional-quality film for best results, many people use ordinary Ektachrome 100; it's readily available, and you can develop it anywhere. Polaroid also offers a variety of instant-processing films; instead of waiting a day or two to get your film back from a processing lab, you can see your results in a minute or two. These instant films do not always produce the same quality as professionally processed film, but they do provide a method for last-minute changes. Larger-format instant-transparency films are available as well as the 35-mm. format; Polaroid even makes a tiny, portable projection stand that you can use to display these mini-transparencies on a standard overhead projector.

MAKING A CHOICE

Should you buy a desktop film recorder, and if so, how should you go about selecting one?



EDITORS' CHOICE

•Polaroid Digital Palette CI-3000

No film recorder will ever be as trouble-free as the average laser printer, but Polaroid Corp. has come remarkably close with its Digital Palette CI-3000, our Editors' Choice. Value-priced at only \$4,495—\$2,500 cheaper than its closest competitor—it redefines value and ease of use in its category.

The other products we reviewed are essentially scaled-down versions of professional film recorders, with cranky personalities to match. By contrast, the Polaroid Digital Palette CI-3000 is designed from the ground up as an end-user product. Everything you need comes as standard equipment, including not only a standard 35-mm. camera back but instant print and transparency backs, an instant film-processing unit, and a slide mounter. The parallel interface means that you don't need to fiddle with boards or jumpers, nor wade through a separate installation manual just to get the unit up and running.

Though it is limited to 2,000-line resolution, the CI-3000 doesn't take a back seat in terms of quality. In fact, its 2,000-line slides look almost as good as the 4,000-line slides produced by competitors, and they are far quicker and easier to produce.

Intelligent design decisions,

including enhanced 33-bit color handling (normally found only on much costlier professional units), do an excellent job of putting quality where it counts, and cutting corners where it doesn't. The Polaroid is slower than its competitors, but in low-volume desktop use the difference will not be significant. For those who really need faster output, Polaroid offers an optional processor board that speeds things up a bit and lets imaging take place in the background.

The availability of drivers is always a worry when it comes to brand-new hardware, and it's true that the CI-3000 needs some improvement in this respect. Polaroid recommends that you use Business & Professional Software's *Presentation Express*, which it sells, but this is hardly the answer for everyone. At the time of our testing, the CI-3000 supports other packages only through CGM files and its own ImagePrint software, which we found to be a chancy proposition. But a direct driver for *Harvard Graphics* and a custom version of *SuperPrint* for *Microsoft Windows* applications should be available by the time you read this. These will open the recorder's horizons to a much wider range of uses.

Perfectly Orchestrated

For Great Electronics and Computer Product
Jameco's careful orchestration of product selection, customer support, and competitive pricing will make your electronics purchase seem effortless... It will be done right, saving you time and money!

Over the past 16 years, Jameco has mastered the distribution of quality electronic components, computer products, and test and measurement equipment. We prequalify each vendor and product against our high standards.

Choose from a full price/performance spectrum of systems, starter to mid-range, to the

Performance
quality-control, make your next done right, saving

the distribution of products, and test and each vendor and product

mance spectrum of most advanced

computing tools. Select from our catalog of over 4000 Jameco products.

Jameco conducts a full program of customer support. Our expert staff will answer your questions and discuss your needs. And you can place an order 24 hours a day!

Millions of satisfied customers have chosen Jameco. Most have requested an encore, joining our large family of repeat customers from businesses, schools and universities, government, and individuals.

If an effortless electronic or system purchase experience sounds good, give us the chance to orchestrate it. Call Jameco for a complete product catalog, or visit our catalog store.



Jameco 16MHz

80386SX Computer Kit

- 2MB RAM (expandable to 8MB)
- 200 Watt power supply
- 101-key keyboard • Multi I/O Card
- Toshiba 1.44MB, 3.5" floppy drive
- DR DOS 5.0 and QAPLUS diagnostic software

\$1199.95/JE3816

DISCONTINUED



Micromax PC Trackball

Memory Modules



Jameco VGA Card

Jameco 33MHz 32KB Cache

80386 Computer Kit

- 4MB RAM (expandable to 16MB)
- 300 Watt power supply
- 6 half-height drive bays
- 101-key keyboard • Multi I/O Card
- Toshiba 1.44MB, 3.5" floppy drive
- DR DOS 5.0 and QAPLUS diagnostic software

\$2599.95/JE3833

DISCONTINUED

Jameco 20MHz 32KB Cache

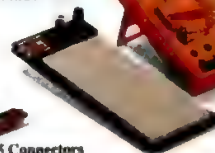
80386SX Computer Kit

- AMI Motherboard with 32KB cache, 4MB RAM (expandable to 16MB)
- 200 Watt power supply
- 101-key keyboard • Multi I/O Card
- Toshiba 1.44MB, 3.5" floppy drive
- DR DOS 5.0 and QAPLUS diagnostic software

\$1899.95/JE3820

DISCONTINUED

Metex Multimeters and Jameco Breadboards



DB25 Connectors

JAMECO
ELECTRONIC COMPONENTS
COMPUTER PRODUCTS



LEDs



1355 Shoreway Rd. Belmont, CA 94002 (415) 592-8097 FAX: (415) 592-2503

Terms: Prices are subject to change without notice. Items subject to availability and prior sale. Complete list of terms/warranties is available upon request.

All trade names are registered trademarks of their respective companies.

© 5/91 Jameco Electronic Components/Computer Products

CIRCLE 179 ON READER SERVICE CARD

Please refer to Mail Key 18 when ordering





POPULAR PRAISE FOR THE PORTABLE DESKTOP

This new generation PC is remarkable for the performance and practicality it provides. Carry it from the office, to home, to multi-site locations so all your programs and files travel conveniently with you.

Customers and critics alike are praising the Brick for its portability, elegant design, whisper quiet operation and screamingly fast power. This diminutive PC with the unforgettable name is designed for the way you always wanted to do computing.

Here's a sampling from recent articles on the Brick.

"Every once in a while a PC product comes along in which the performance, design and concept are so uncommon that a little voice inside you says you really want to have one."

*Jon Pepper,
PC Sources, 11/90*

"Engineered with the way people actually work in mind. It answers the question of how to transport an entire environment to and from several work sites, something no other product handles elegantly."

PC/Computing, 12/90

"Overall the Brick represents a clever counter to conventional notebook designs. It solves the fundamental problem of two-location computing. You get to keep your home and away files in sync because they are the same."

*Tracy Licklider
BCS UPDATE, 7/90*

"Ergo's Brick maintains the functionality of a desktop PC within a small form-factor...the Brick is a real performer, consistently outperforming both Compaq's and IBM's 16 MHz SXs on PC Labs computer benchmark tests."

*Matt Ross,
PC Magazine, 9/25/90*

"The Ergo Brick—that delightfully small, full-featured 386SX™ machine. It's almost silent, it's fast... a great personal computer in every other respect too."

*Bill Machrone,
PC Magazine, 1/15/91*

"The Brick is the first real innovation in DOS based computers in a long, long time."

*Computer Shopper,
1/91*

"The philosophy behind the Brick is so obvious that I'm surprised that no one has thought of it before...you can keep a monitor and a keyboard at each work location, carrying only the computer guts (and your own data) between locations...in a world of boring and utilitarian PCs, the Brick stands out for both its elegance and its technological sophistication."

*Stan Miastkowski,
BYTE, 6/90*

1990
-FINALIST-
PC Magazine Award
for Technical Excellence



THE BRICK



3" x 8" x 11"

"The Brick is a simple idea that is beautifully executed, resulting in a machine whose time has clearly come. You get the convenience of a laptop with the uncompromising performance of a desktop."

Jon Pepper,
PC Sources,
11/90

"An ideal system for those who split their working time between home and office...The stylish 'black granite' and beige cases look as if they came straight from the pages of a Sharper Image catalog."

PC Week, 9/24/90

"The Brick is first class all the way. Its appearance and feel suggest even higher quality than that of the Toshiba and Compaq... This system provides an amazing amount of features and support for the price."

Peter Varhol,
Personal Workstation
11/90



Hi-res video drivers are included for over 25 major applications including Windows 3.0, WordPerfect, Ventura, Autocad, Cadkey, and Lotus. The Docking Terminal (\$349) permits instant hook-up of all cables and adds another 16-bit 3/4 length slot.

"...everyone who sees it falls in love with it... Recommended."

Jerry Pournelle,
BYTE, 1/91

"Using the Brick is a pleasure. In fact, several things about the Brick are terrific. By any standard it's a well equipped and competitively priced 386SX desktop; when you add the appeal of its diminutive size, it becomes adorable."

Eric Grevstad,
Portable Office, 12/90



"The beauty of this arrangement is that you never have to worry about the consistency of your data files... you just take it all with you."

Henry Fersko-Weiss,
PC Magazine, 3/91

"Only slightly larger and heavier than a college dictionary, the Brick is a faux-granite-finished portable CPU that explores the middle ground between desktop PCs and portable computers."

Fred Paul,
PC/Computing,
8/90

\$2,495

INCLUDES

- ▲ 16 MHz Intel 386SX
- ▲ 4 MB RAM (exp to 8 MB)
- ▲ 44 MB 28ms hard disk
- ▲ 2,400 bps modem
- ▲ 1024 x 768 VGA adapter with 1 MB video RAM
- ▲ 3.5" floppy/1.44 MB
- ▲ 16-bit half card exp. slot
- ▲ DOS 3.3 or 4.01
- ▲ 1 year warranty
- ▲ 30 day money back guarantee
- ▲ Freight Prepaid

Plus Your Choice of:

- ▲ Windows 3.0 with Adobe ATM, Mouse or:
- ▲ DESQview 386 with QEMM, Manifest, Tree86, Cache86
- ▲ All software completely set up Ready to go

Options:

- ▲ 104 MB 24ms HD add \$395
- ▲ 212 MB 16ms HD add \$995
- ▲ 20 MHz Brick add \$250
- ▲ 8 MB total RAM add \$396
- ▲ 387SX Coprocessor
 - 16 MHz add \$395
 - 20 MHz add \$445
- ▲ 12" 640 x 480 mono VGA monitor & 101 keyboard-beige add \$218
- ▲ 14" 640 x 480 color VGA monitor & 101 keyboard-beige add \$464
- ▲ Color coordinated VGA monitor & keyboard, as shown add \$195
- ▲ Docking Terminal add \$349

For further information
or to request our **FREE Catalog**

CALL TOLL FREE

1-800-633-1925

Or to receive information via **FAX, 24 hours,**
CALL 1-800-THE-BRICK

CIRCLE 479 ON READER SERVICE CARD

One Intercontinental Way
Peabody MA 01960

TEL: (508) 535-7510
FAX: (508) 535-7512



Saving money may be the first concern that springs to mind when you think of getting a film recorder. The idea of avoiding those \$15-per-slide fees may be awfully tempting, but before you start making rosy projections, consider that the real cost of using a film recorder goes well beyond purchasing the recorder itself. For one thing, slides take so long to image that most sites doing any kind of volume must dedicate a PC to the task; this is doubly necessary if you're using a software PostScript interpreter or a custom version of *SuperPrint* as a *Windows* driver, both of which rely on your PC to do the brute-force work of rasterizing the images. It's also important to consider the costs of film processing.

Most important, though, is the intangible cost of your time. Bringing a film recorder in-house means that you will be doing a lot of the work that the slide service bureau formerly took care of, including troubleshooting. Seen in this light, overall usability may be the single most important criterion by which to judge the suitability of a film recorder intended for desktop use.

Service bureaus can afford to tinker with adjustments, fine-tune color tables, and commission custom drivers, and the high prices of professional recorders make it worth the vendors' while to provide on-site service. But as an end user with a desktop recorder, you're on your own. So you should pay attention to such niceties as automatic camera backs and the quality of installation manuals when you read the accompanying reviews.

Though the low volumes that most desktop users produce make speed relatively unimportant, the quality of the slides is critical. While these recorders do not quite equal the quality available from the expensive professional recorders that slide service bureaus use, they're easily good enough for most uses. Unless you are going to present your images in a huge auditorium—or your audience is exceptionally picky—you'll do just fine with these.

The four machines described in the following pages offer various combinations of features and performance at a price that can be justified in a short time. If you currently rely on outside services to produce a significant number of slides each year, and you're willing to take on the burden of learning and operating the equipment, you will find one of these to be an affordable alternative.

AGFA MATRIX DIVISION

Agfa ProColor

by John R. Quain

On the outside, not much appears to have changed on the Agfa ProColor since we reviewed it two years ago, when it was called the Matrix ProColor (*PC Magazine*, February 28, 1989). Back then, the ProColor received an Editors' Choice award. On the inside, though, Agfa has made some adjustments. Under the hood, its improved rasterizer makes it a little faster, and better software makes it easier to use. But Agfa Matrix Division's desktop recorder (which costs \$5,495 plus \$1,995 for the PC interface kit) is now plagued by problems with its output quality.

The ProColor is solid but not spectacular when it comes to features. It comes with a semiautomatic 35-mm. Pentax camera back, and an optional Polaroid 3- by 4-inch back is available for \$1,095. But the ProColor does not have a self-loading camera or a Polaroid instant camera back for transparencies, though Agfa hopes to make them available at some unspecified date. And unlike the other film recorders, which recalibrate after every slide, the ProColor recalibrates after every five images.

The ProColor's PC interface kit is based on Agfa's MVP Star-16 rasterizer board. Based on a 16-MHz 68000 microprocessor (upgraded from a 12-MHz processor about the time we tested), this hefty 8-bit board offers a high-speed GPIB interface between machine and recorder—and consumes two slots in the process. Agfa does offer a PostScript option (licensed from Adobe), but only in the form of the Chromascript, a standalone computer that comes with a 68020 processor, 8MB of RAM, an 80MB hard disk, and a \$14,950 price tag, which is far beyond the budget of most ProColor users. The accompanying documentation is thorough, if a bit overwhelming.

NO DIRECT PRINTING SUPPORT

Unlike some other recorders, the ProColor does not support direct printing from software. Instead, it comes packaged with Agfa's memory-resident MVP Conductor software, which lets you batch files in Agfa's proprietary SCODL format and send them to the recorder. This

isn't necessarily a problem; SCODL (which stands for Scan Conversion Object Description Language) is widely supported, and MVP Conductor has many convenient features. It lets you crop and zoom images as well as batch them, and handy utilities let you alter text and other specifications within the files. Still, this can be a roundabout way of making slides; you must first store the graphics application files as SCODL files, then start *Microsoft Windows* 3.0, select MVP Conductor, and send the SCODL files out to the recorder.

MVP Conductor has a few kinks that need to be worked out. You can't abort the imaging process short of hitting the power switch. And it currently supports *Windows* 3.0 only in real mode; at the time of our testing, Agfa was working on a new release of MVP Conductor to support *Windows* 3.0's protected modes, but no release date had been set.

FONT TROUBLE

When you are working with *Harvard Graphics*, Version 2.3, Agfa recommends that you use *Harvard's* fonts so that your output will look more like what you see on the screen. Given the poor quality of the ProColor's five internal hardware fonts, this proved to be good advice. The recorder's font problems are immediately discernible in any slide that uses them. Spacing and kerning are poor on both serif and sans serif fonts, at both 2,000-line and 4,000-line resolutions. In some cases,



Agfa ProColor

Agfa Matrix Division, One Ramland Rd.,
Orangeburg, NY 10962; 800-876-7543,
914-365-0190.

List Price: \$5,495 (includes 35-mm. camera back). PC interface kit (includes MVP Star-16 IEEE interface board and Conductor), \$1,995. 3- by 4-inch camera back, \$1,095.

Requires: 286-based PC or better, 640K RAM, DOS 3.0 or later.

In Short: The smallest in Agfa's long line of film recorders produced the poorest slides on our tests. It is badly in need of an upgrade.

CIRCLE 425 ON READER SERVICE CARD



**"We're ready
for a more
powerful SX.
I'm choosing
the Acer
1120/SX."**



When you are ready for a computer crafted entirely by a single corporate hand that delivers no-compromise 386SX performance, superior VGA graphics, and the power to run the software of today and tomorrow, you're ready for the Acer 1120/SX.

Loaded with the new Intel® i80386SX™ running at 20 MHz, it has standard 2 MB of fast system RAM expandable up to 8 MB (with an optional factory-installed 100-MB hard drive), integrated high quality VGA video, built-in parallel, serial, and mouse ports, a choice of either a 3.5" or 5.25" floppy disk, and a PS/2 mouse.

The surface mount design of the motherboard greatly increases the reliability

of the Acer 1120/SX, and results in a more compact footprint. With no switches to set, installation is easy. A password security feature protects your data, and you can choose from a full line of AcerView VGA monochrome and color monitors to complete your systems purchase.

Bundled with MS-DOS® 3.3, and MS-Windows® 3.0, the Acer 1120/SX also supports OS/2®, UNIX®, XENIX®, and NOVELL® NetWare and is backed by our rock-solid 2 year warranty.

Call 1-800-SEE-ACER for more information on the premium 20 MHz SX personal computer, the Acer 1120/SX.

One look and you, too, will agree that there's no compromise with the premium Acer 1120/SX.

Acer 

Your Global Partner in Computing

CIRCLE 519 ON READER SERVICE CARD

© 1991 Acer America Corporation.
Acer and the Acer logo are registered trademarks of Acer Inc. Altos is a registered trademark of Altos Computer Systems. All other product names are trademarks of their respective manufacturers.

GRAPHICS FILM RECORDERS



FILM RECORDERS: SUMMARY OF FEATURES

Products listed in ascending price order



	Polaroid Corp. Polaroid Digital Palette CI-3000	Presentation Technologies Montage FR1	Agfa Matrix Division Agfa ProColor	Lasergraphics Inc. LFR
--	---	---	--	------------------------------

Price (including interface)	\$4,495	\$6,995	\$7,490	\$8,950
-----------------------------	---------	---------	---------	---------

GENERAL SPECIFICATIONS

Dimensions (WDH, in inches)	8 x 16 x 7	14 x 17 x 7	15 x 21 x 10	10 x 23 x 9
Weight	15 lbs.	22 lbs.	38 lbs.	31 lbs.
Power (110V/220V AC)	■ / ■	■ / ■	■ / ■	■ / ■
Warranty	2 years	1 year	1 year	90 days

IMAGING COMPONENTS

Internal CRT:				
Diagonal screen size	3 inches	3 inches	7 inches	8 inches
Tube length	5.5 inches	6.5 inches	7.7 inches	12 inches
Spot size	Under 2 mils	3 mils	5 mils	1.6 mils
Camera backs:				
35-mm.	■	■	■	■
35-mm. pin-registered	Optional	□	□	Optional
4- by 5-inch transparency	Optional	□	□	Optional
8- by 10-inch transparency	□	□	□	Optional
Polaroid 339 instant print	Optional	□	□	Optional
Polaroid 669 color print	■	Optional	□	Optional
Polaroid 691 film transparency	■	Optional	Optional	Optional
Film handling:				
Self-loading	■	■	□	■
Automatic advance	■	■	■	■
Automatic rewind	■	□	□	■
Auxiliary equipment:				
Film processor	■	□	□	□
Mounter and cutter	■	□	□	□
Bulk film pack	□	□	□	Optional
Front-panel controls	□	□	■	□
Automatic calibration	Every image	Every image	Every 5 images	Every image

IMAGING CHARACTERISTICS

Addressable resolutions:				
1,000 lines (1,024 x 683 pixels)	■	□	□	□
2,000 lines (2,048 x 1,366 pixels)	■	■	■	■
4,000 lines (4,096 x 2,732 pixels)	□	■	■	■
Maximum image size	Unlimited	33MB	Unlimited	Unlimited
Hardware fonts built-in	8	43	5	9
Software font support:				
Adobe Type 1	■	■	■	□
Bitstream	■	■	■	□
Compugraphic	■	■	■	□
URW	■	■	■	□

INTERFACE CHARACTERISTICS

Interfaces supported:				
PC (ISA)	■	■	■	■
PS/2 (MCA)	■	■	■	■
Macintosh (SCSI)	□	■	■	■
Interface types available:				
Proprietary interface board	■	■	■	■
SCSI host controller board	□	□	■	□
Parallel	■	■	□	■
Serial	□	■	□	□
Cable length	6 feet	6 feet	6 feet	6 feet

PC—Editors' Choice ■—Yes □—No

letters are so badly aligned that text slides look like ransom notes, and smaller characters can be almost illegible.

The ProColor has other imaging difficulties. At 2,000-line resolution, the white letters in our test slides took on a pinkish tinge, and our gray-gradient backgrounds looked more like an excursion through the colors of the rainbow than a shift from gray to black. Imaging the slides at 4,000 lines eliminated the roseate lettering, but smaller words were still fuzzy (this may be a factor of ProColor's rather large spot size), and vignetting (in which transitions between colors take place over too small a range) actually increased. An Agfa representative claimed that these problems might have been due to problems in film development or recorder adjustment, but the effect was far more severe than what we encountered on other machines under similar conditions.

Imaging times were not terrific either; only the Polaroid Digital Palette CI-3000, which did not have the benefit of an expensive high-speed interface board, was slower. In low-volume usage the added seconds won't matter much, but you should get more for your money.

The Agfa ProColor is not a recorder we can recommend at the moment. Its poor images and relatively slow performance make any of the other film recorders in this group a better choice.

LASERGRAPHICS INC. LFR

by Alfred Poor

At \$8,950, Lasergraphics' LFR is the most expensive film recorder in this group. That's not surprising; in aims and in performance, it's more like a medium-range recorder at a desktop price than a true desktop recorder.

From the outside, the LFR looks fairly typical of its class: It's a big beige metal box with a hole on one end where you attach a camera back. The difference lies in the 8-bit full-length Rascol II board that comes with the LFR. The Rascol II is a full-fledged rasterizer, with a 10-MHz 68000 processor and 2MB of RAM on-board. Once your images are spooled to the card for processing, your PC is free to do other things.

The Rascol board can be used with a variety of image file formats; software for either raster or vector image processing is

INTRODUCING SQUEEGEE.[™] THE AFFORDABLE GRAPHICS ACCELERATOR THAT MAKES WINDOWS PERFECTLY CLEAR.

You know the value of Windows 3.0. But Windows demands more performance and resolution than VGA provides. Enter Squeegee, from Spectragraphics. Squeegee is the graphic accelerator designed specifically to make Windows all it can be. With performance up to 15 times faster than super VGA. And resolution to make your Windows sparkle at any size. All at a price that's hard to pass up. Add one

Squeegee[™] for AT bus — \$595
Squeegee[™] for Microchannel[®] — \$695
1024 x 768 resolution, non-interlaced, 16 colors
256 color versions — additional \$250
High performance Windows and PM drivers
1 Year Limited Warranty
Call for competitive prices on
high-performance monitors

of our low-cost,
high-resolution
monitors and
the advantages of
doing Windows with
Squeegee will become
perfectly clear.



30 day no-risk guarantee. FREE end-user support line.

Call 1-800
800-9599 \$595

CIRCLE 171 ON READER SERVICE CARD

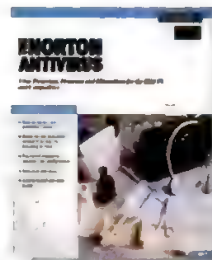
SPECTRAGRAPHICS

Squeegee[™] is a trademark of Spectragraphics, Inc.
Microchannel[®] is a trademark of the IBM Corporation

PETER NORTON NOW CURES VIRUSES.



Warning. Peter Norton has determined that PC viruses can be hazardous to your data. So to combat the threat, he's developed the Norton AntiVirus™, *Peter Norton* the only comprehensive virus protection, detection and elimination software for DOS.



The Norton AntiVirus stops viruses dead in their tracks before they infect your system. It also exterminates viruses already living on your hard disk or floppies. And it operates invisibly in the background, alerting you only when a virus is detected.

For protection against new viral strains, just call the 24-hour Virus Newsline. It's a free service that provides new virus information and easy instructions to keep your virus protection up to date, without the need to upgrade your software.

The Norton AntiVirus is 100% compatible with PC networks like Novell® and 3Com.® MIS managers can configure and password protect the Norton AntiVirus to meet their corporate needs.

And of course, it's Windows® compatible.

All this protection is yours for only \$129*, with a 60 day money-back guarantee.

Take it from Peter Norton. If your PC is unprotected, do the right thing: Pick up a copy of the Norton AntiVirus. Call for more information.

1-800-343-4714, Ext. 711 P

SYMANTEC.

*Suggested retail price. © 1991 Symantec Corporation. The Norton AntiVirus is a trademark of Symantec Corporation. All other brand or product names mentioned are trademarks or registered trademarks of their respective holders.

CIRCLE 264 ON READER SERVICE CARD

GRAPHICS FILM RECORDERS

part of the standard package. You can also make global adjustments, such as brightness and contrast control, through software. Lasergraphics did not have a *Windows* 3.0 driver ready at the time of our testing, but one is under development and should be ready for release later this year.

The Rascol II supports other output devices besides the LFR, such as color page printers; a similar version (the Rascol IV) is available for Micro Channel computers. And for more-professional users, Lasergraphics ships a new high-end version of the recorder, the LFR Plus, which retails at \$13,950 for the PC version. It comes with a more powerful rasterizer (which makes it 50 percent faster, according to Lasergraphics), and it also supports 33-bit color for smoother shaded backgrounds.

TROUBLESOME INSTALLATION

The documentation that comes with the LFR is confusing, and this makes installation something of a chore. Lasergraphics supplies installation and user manuals, but there are separate sections for the film

recorder and the Rascol II rasterizer board. The instructions on installing the rasterizer come second in the binder, though you must deal with it first in setting up the recorder. The documentation could be vastly improved by integrating the two existing sections and providing a seamless set of instructions for installing and operating the unit.

On the other hand, the LFR's intelligent camera back is a real asset. When you load a roll of film, the camera unspools the entire roll onto its take-up roller and then exposes images starting at the end. While this may sound backwards, it is done with good reason: By unwinding the full roll, the camera is able to count exactly how many frames are available. It then shares this information with you through an LCD window along the top edge of the camera; you always know how many frames are exposed and how many are left. The camera also informs you whether it is in the middle of exposing a frame—a handy piece of information when you are trying



LFR

Lasergraphics Inc., 20 Ada, Irvine, CA 92718; 714-727-2651.

List Price: \$8,950 (includes Rascol II rasterizer board and 35-mm. camera back). 4- by 5-inch transparency back, \$1,595. 8- by 10-inch transparency back, \$2,995. Instamatic back, \$1,495. Bulk load camera backs: Double M, \$4,950; Oxberry, \$9,550. Postscript option (Freedom of Press), \$495.

Requires: 2MB RAM, DOS 2.0 or later.

In Short: The Lasergraphics LFR is the fastest recorder in this group, and it offers a comprehensive range of camera back options, but it's also the costliest, and the quality of its slides falls a little below the Montage's.

CIRCLE 486 ON READER SERVICE CARD

to debug problems. Lasergraphics offers by far the widest selection of alternative backs in this group, including bulk-load backs that make the LFR suitable for high-volume usage.

FILM RECORDERS: SUMMARY OF FEATURES

Products listed in ascending price order

	Polaroid Corp. Polaroid Digital Palette CI-3000	Presentation Technologies Montage FR1	Agfa Matrix Division Agfa ProColor	Lasergraphics Inc. LFR
--	---	---	--	------------------------------

COMPATIBILITY

Slide file formats:

CGM	■	■	□	■
HPGL	□	■	□	■
Lasergraphics Language (LL)	□	■	□	■
Mirage (.IMA)	□	□	■	□
Pict (Macintosh)	□	□	■	■
SCODL (Agfa Matrix)	□	■	■	■
Targa (.TGA)	■	■	■	■
TIFF	■	■	■	□
Videoshow (.PIC)	□	■	□	■

Drivers available:

Freelance Plus	■	□	■	□
GEM	□	□	■	□
Harvard Graphics	□	■	■	■
Microsoft Windows 2.1	□	■	■	■
Microsoft Windows 3.0	■	■	■	■
OS/2 Presentation Manager	□	□	□	□
PostScript option available	□	■	■	■

Compatible film types:

Ektachrome	■	■	■	■
Kodachrome	□	■	□	■
Polachrome	■	■	■	■

SOFTWARE

Batch-printing software	■	■	■	□
Works in background	□	■	■	□
Screen capture software	□	□	■	■
Diagnostics	■	□	■	□

PC—Editors' Choice ■—Yes □—No

MIXED RESULTS

The end results, however, are mixed. The LFR is definitely the performance leader, turning in the fastest times on our tests. Its edge is greatest at 2,000-line resolution, where the next-fastest unit takes 15 to 20 percent longer, a difference of about 15 to 20 seconds per slide. At the higher 4,000-line resolution, the LFR completes each image 10 to 20 seconds faster than its closest competitor, but since the images take about 3 minutes apiece, this difference represents a smaller proportional advantage.

For image quality, the LFR proved less exceptional. While the slides looked good overall, our panel of observers noticed some problems with jaggies on text. The bottoms of some rounded letters got clipped, and letter spacing is also uneven in places. These problems are most pronounced at 2,000-line resolution but present at 4,000 lines as well. We also noticed colored fringes between areas of solid red and adjacent colors, and some slight banding on gradient backgrounds. The images are certainly acceptable, but not as good as you might expect from the most expensive of the recorders we reviewed.

In terms of speed and features, the LFR

definitely rates as the Cadillac of this group. But it comes at a correspondingly high price, and for most desktop uses, you'll find a better balance of cost, performance, and image quality elsewhere.

POLAROID CORP.

Polaroid Digital Palette CI-3000

by Alfred Poor

In general, price and quality sit on opposite ends of a seesaw; when one goes up, the other goes down. Polaroid Corp.'s new Digital Palette CI-3000 breaks the connection by offering excellent quality at the lowest list price of any film recorder in our review, a mere \$4,495. It also breaks new ground in terms of ease of use and standard features.

One aspect of the CI-3000 helps explain its lower cost: It is capable only of 2,000-line resolution, which is half the maximum resolution offered by the other units in this review. But the true measure of performance is in the results, not the specifications. And the quality of its images is excellent. Background gradi-

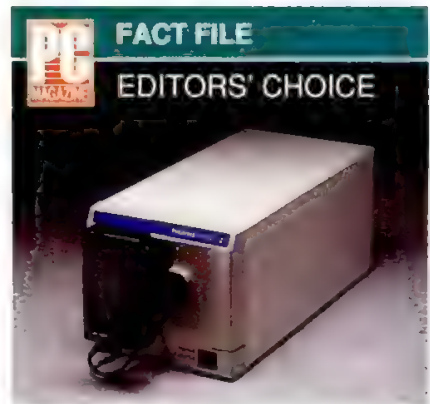
GRAPHICS FILM RECORDERS

ents are very good, with no banding and only a small problem with vignetting. Colors are vivid and crisp, and there are no obvious jaggies on text or images. In fact, the images are of better quality at 2,000-line resolution than most competitors at 4,000 lines.

In spite of its low cost, the CI-3000 boasts many specifications to equal its competitors. This compact unit is based on a 5-inch-diagonal CRT with a spot size of less than 2 mils. Its digital imaging technology supports 33-bit color for smoother gradients. And everything is contained in an 8- by 16- by 7-inch case weighing just 15 pounds.

LONG ON ACCESSORIES

You might guess that Polaroid has kept costs down by cutting back on accessories, but you would be wrong. The product comes not with one but with two camera backs—one for 35-mm. film and another for instant pack film—plus an automated processor for Polaroid's Polachrome instant 35-mm. film, and an illuminated viewer that helps you inspect and mount your slides. The Digital Palette CI-3000



Polaroid Digital Palette CI-3000

Polaroid Corp., 575 Technology Sq., Cambridge, MA 02139; 800-225-1618, 617-577-2000.

List Price: \$4,495 (includes parallel interface, 35-mm. and instant pack film camera backs, slide developer and mounter). **Presentation Express:** \$695; with Graphics Creator Card, \$2,495. Auto-film camera back, \$399. 4- by 5-inch transparency back, \$599.

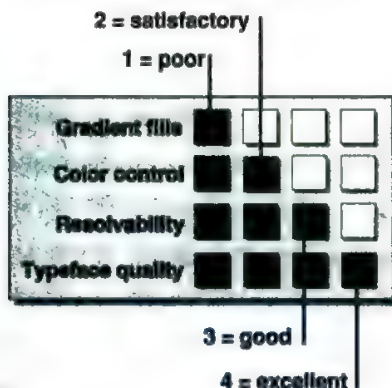
Requires: 286-based PC or better, 640K RAM (2MB RAM recommended), DOS 3.0 or later. **In Short:** Though less powerful than its competitors, Polaroid's new Digital Palette CI-3000 more than makes up for this in practicality. With easy installation and operation, a good set of standard accessories, and some of the best-looking slides, it's the best value in this group.

CIRCLE 427 ON READER SERVICE CARD



FILM RECORDERS: OUTPUT QUALITY

For many people, slide quality is the overriding concern when choosing a film recorder. Use these ratings to get an idea of which recorders have the best-looking output—and how they compare with the slides you can get from a service bureau. (See the sidebar "Evaluating Slide Quality" for details on our judging procedure.)



Gradient fill evaluates the quality of the transition within a gradient-filled background, with attention to the presence of banding (visible transitions between shades) and vignetting (too abrupt a transition between top and bottom colors). A satisfactory slide may have some vignetting and banding. A slide with no banding earns higher marks, and one with neither banding nor vignetting earns the best score.



Color control involves freedom from fringing (a halo of unwanted color between two differently colored objects) and any visible inconsistencies in color density, saturation, or balance. A satisfactory slide has good color balance; the best slides lack fringing and have fully saturated colors.



Resolvability evaluates the recorder's ability to produce thin, smooth lines and curves. In practice, recorders with poor resolvability have characters or objects with jagged lines or a fuzzy appearance. A satisfactory slide may have slight jaggedness or fuzziness on text or objects.

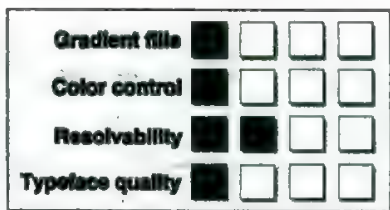


Typeface quality concerns the aesthetic characteristics of the film recorder's default serif and sans serif fonts. Satisfactory typefaces are attractive, with no egregious tracking problems; good typefaces have no tracking inconsistencies at all, although intermittent problems with kerned pairs are acceptable.

AGFA ProColor

Overall Quality ■ ■ ■ ■

Our panel almost unanimously agreed that the Agfa ProColor has by far the worst output. All its slides exhibited severe banding and color distortion problems, with vignetting readily apparent on gray-scale test slides. The reds appeared overdriven, as evidenced by a strong pinkish cast to gray gradients and white type. The standard serif and sans serif fonts were abysmal. Letters were poorly formed, and text was so badly aligned that the baselines looked jagged. Kerning was inconsistent: Letters were spaced too tightly, and numbers too loosely.



GRAPHICS FILM RECORDERS

works with a wide range of films (18 in all), and you can get an optional bulk film camera back (\$399) or a 4- by 5-inch transparency back (\$599) that gives you even more options.

At the time we tested, the product had direct drivers only for Business & Professional Software's *35mm Express* and

print CGM, TIFF, or Targa files using Polaroid's ImagePrint utility.

Unique in this group, the CI-3000 does not require an adapter card. To set up the unit, all you have to do is connect it to a parallel port on your PC, plug it in, and turn it on. No special drivers, no configuring jumpers or DIP switches, no struggling with I/O addresses and IRQs and other arcane details. It is truly a plug-and-go installation, and you don't even need to open your computer's case. After spending about 20 minutes warming up, the recorder is ready to run.

This arrangement does extract a cost in performance; the CI-3000 was the slowest in the field on our tests. But its times were generally within a minute of the next-slowest competitor at 2,000-line resolution, and when you compare the CI-3000's 2,000-line times with the competitors' 4,000-line times, the difference between the CI-3000 and the fastest unit

dwindles to just over a minute. Since the Polaroid's 2,000-line images rival the 4,000-line pictures produced by the others, this timing comparison is the most significant one. For those who really need more power, Polaroid offers a special adapter board, the Graphics Creator Card (\$2,495), which lets you generate images in the background. It comes with a copy of *Presentation Express* software.

Though it doesn't lead the field in imaging speed, the Polaroid Digital Palette CI-3000 beats all its competitors in the one factor that matters most: value. Despite the limit of 2,000-line resolution, its output is very close to the best, yet its price is roughly half the cost of most of its competitors. This film recorder is the best argument yet for creating your slides in-house.

PRESENTATION TECHNOLOGIES Montage FR1

by John R. Quain

A Spartan design doesn't always mean simplicity and ease of use, as we discovered with the \$6,995 Montage FR1 from

The Polaroid Digital
Palette beats its
competitors at what
matters most: value.



Presentation Express, plus *Lotus Freelance Plus*. But Polaroid was hard at work creating additional drivers (including drivers for *Harvard Graphics* and *SlideWrite Plus*), and it plans to include direct support for *Windows 3.0* applications via a customized version of *SuperPrint* from Zenographics, which will come with 22 scalable fonts. In the meantime, you can

LFR

Overall Quality ☒ ☒ ☐ ☐

The LFR produced acceptable but not extraordinary output. It showed slight banding and vignetting on all gradient fills—just enough to be noticeable. As with the Agfa ProColor, however, the red seemed to be working overtime, causing severe fringing and shifting the color balance of all the images. The standard typefaces were attractive and crisply imaged, with only a few jaggies, but leading (line spacing) was poorly controlled, and the descenders showed evidence of clipping at the baseline; underlines dropped out as well.

Gradient fills



Color control



Resolvability



Typeface quality



POLAROID DIGITAL PALETTE CI-3000

Overall Quality ☒ ☒ ☐ ☐

Of the four film recorders we tested, the Polaroid Digital Palette CI-3000 had the best-looking output. While some vignetting was apparent on all gradient fills, there was no banding at all, and our panel felt that the transition method, in which the bottom color begins to appear as flecks on the top color rather than in bands, was graceful and attractive. Colors were vibrant and appealing, with no perceptible color shift or fringing. Even at small sizes, the text was sharp and readable.

Gradient fills



Color control



Resolvability



Typeface quality



MONTAGE FR1

Overall Quality ☒ ☒ ☐ ☐

Like the LFR, the Montage FR1 showed significant vignetting and banding on gradients. But its vignetting was pretty much confined to the gray-scale gradients; blue-to-black gradients exhibited smoother transitions. There was consistent blooming (the effect of oversaturation) on yellows and reds, and fringing was apparent on most text and graphics objects. The unremarkable typefaces appeared slightly fuzzy, with a few kerning and clipping problems.

Gradient fills



Color control



Resolvability



Typeface quality



LEO BURNETT IS SOLD ON ALL OF



ADVERTISING THESE NETWORKS.

Leo Burnett Advertising knows the value of selecting top-rated network programming for its clients. And for its computers.

So when Burnett's information services group decided on a PC-based network, they chose NetWare®, the only network operating system that's in its eighth generation. According to Bill Engelbrecht, executive vice president of administration, "The network we installed must take us beyond the year 2000. That's why we chose to align ourselves with the leader in networking."

Needless to say, long-term relationships are nothing new to Burnett. After all, Burnett has retained some of this country's premier advertisers for decades, growing into one of America's largest advertising agencies with billings exceeding \$3.2 billion.

"One of our strategic goals is global connectivity between the 49 offices we maintain around the world, and the ability to further improve communication with our clients," recalls Engelbrecht. "With NetWare, many of our clients have access to information on our network, giving us a competitive edge in account service."

Burnett's network, which was

installed in just three days, spans 29 floors to link 1,200 personal computers, integrate an IBM mainframe and provide remote connectivity. In fact, its advanced capabilities earned Burnett the Excellence Award from the Enterprise Networking Institute.

But beyond exceptional functionality and the industry's tightest security, NetWare offers something other solutions simply can't — compatibility with more applications, computing environments and hardware than any other network operating system.

So call 1-800-LANKIND for your NetWare Buyer's Guide. And learn how NetWare is helping make Leo Burnett a commercial success.



**The Past, Present, and Future
of Network Computing.**

CIRCLE 322 ON READER SERVICE CARD

Presentation Technologies. But though it's far from simple to set up, once you become accustomed to it, the Montage rewards your efforts with sharp and attractive slides.

Employing the same Rascol II rasterizer board as Lasergraphics' LFR, the Montage has some desirable features. It comes with an auto-loading 35-mm. camera back, and Polaroid instant-print

and instant-transparency backs are available as options. It is compatible with a variety of file formats (including CGM and Targa), and it has garnered reasonably wide direct-printing support among graphics packages. A custom version of *Freedom of Press* is available for those who need a PostScript option, and by the

time you read this, Zenographics should have completed a custom version of *SuperPrint* for the Montage, which will let you image slides directly from any Windows application using high-quality scalable fonts.

Using the standard 35-mm. camera back (from Pentax) is a happy experience. Most of its functions are automatic; it auto-loads the film when you send the

EVALUATING SLIDE QUALITY

by Lori Grunin

To be consistent with the theme of this special issue, we evaluated film recorders and slide services primarily as output options for your PC-generated business presentations. While all the recorders and services reviewed here can image raster files, we chose not to emphasize those capabilities in our testing; instead, we chose the most popular and widely supported business graphics program, *Harvard Graphics*, to produce our test slides. The initial test suite also included *PowerPoint* files and PostScript files created with *CorelDRAW* and *Micrografx Designer*, but none of the recorders had a shipping Windows driver at the time of our testing, and only one had a PostScript-compatible interpreter, so we were unable to run comparative tests on these files.

In testing these four recorders, we concocted a set of images to process that were designed to show a recorder's strengths and weaknesses. With input from various sources—most notably Management Graphics (makers of the Solitaire line of high-end professional film recorders)—we developed a set of images to test specific pitfalls that all recorders must face at one time or another. We had slides with gray gradient backgrounds, which require strict control of the red, green, and blue values to image properly; these helped us to detect color balance problems. We had slides with samples of the default serif and sans serif fonts, to help evaluate the quality of the text alignment, leading, and kerning. And we had slides that included tricky side-by-side color combinations, such as red next to green, to make any blooming and fringing problems stand out. In

addition, we included a number of typical business slides, such as word charts, pie charts, and illustrative graphics.

TESTED BY DEFAULT

We tested each recorder in its default configuration; though service bureaus often fiddle with RGB intensities and other adjustments to get better results on different types of images, we needed to get repeatable results, and we reasoned that most business users will not have time for too much adjustment. Before shooting the final test slides, we shot instant slides (using Polarachrome film) to ensure that we had consistent and repeatable results.

Although we don't recommend using it, we chose Kodak Ektachrome 100 film because it is the slide film most commonly used in these recorders. To minimize the possible variations introduced in the developing process, we purchased all film from the same emulsion batch, and had all film processed directly by Kodak, which kindly donated its services to us for the purpose. In the case of any egregious problems, the slides were reshot and sent back to Kodak. All slides were Wess glass-mounted to prevent film degradation.

PASSING JUDGMENT

To evaluate the quality of the slides from the film recorders and slide service bureaus, we presented the slides to a panel of judges. We knew that ascertaining what was "good enough" would require both trained and untrained eyes to balance each other's perceptions. Moreover, visual perception characteristics differ between the sexes as well as among individuals. Therefore, our panel of judges com-

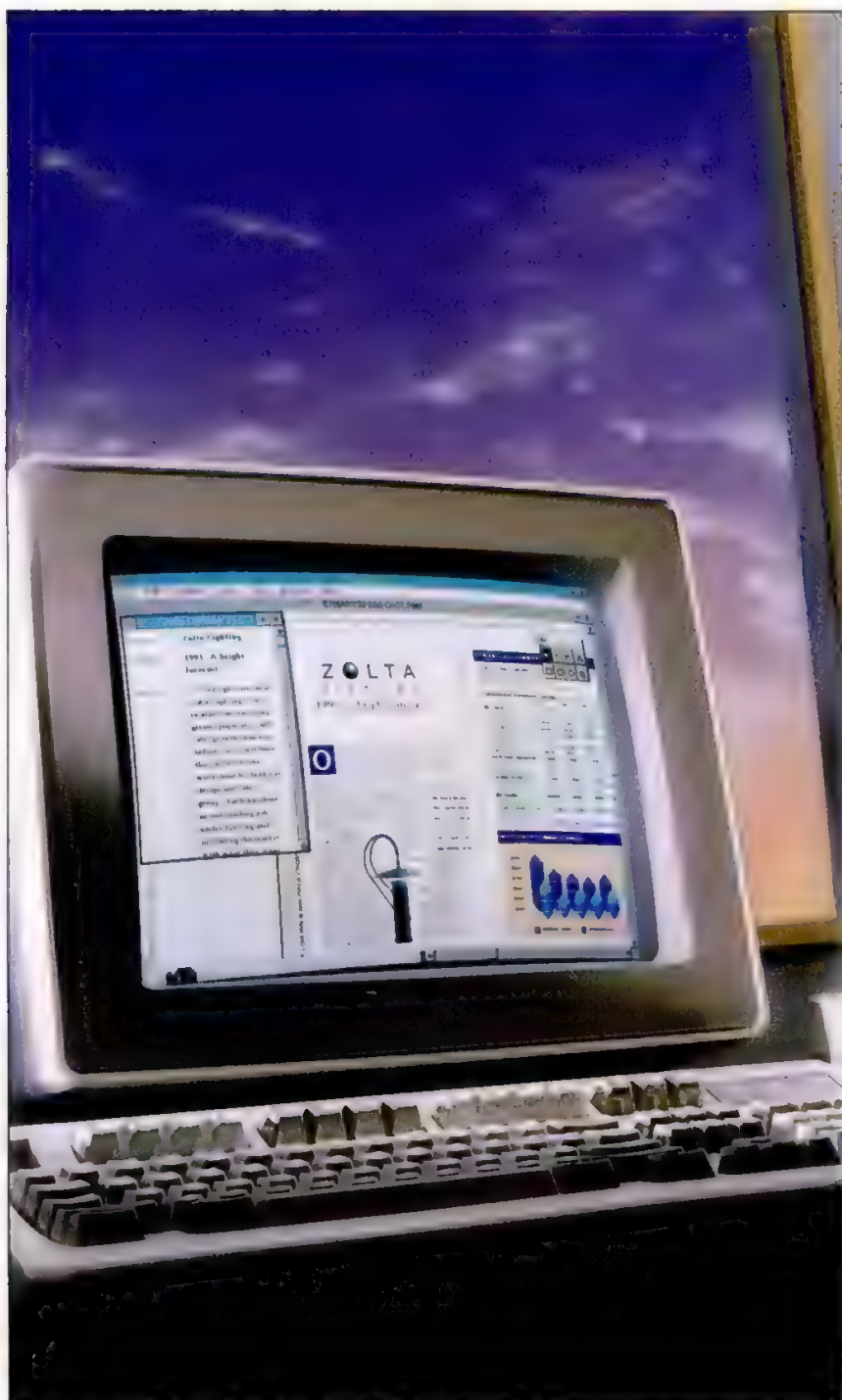
prised three men and three women, including both art professionals and untrained viewers.

Before beginning the viewing, we presented the judges with the following list of artifacts, which they indicated as present, absent, or only slightly visible on each slide:

- Banding (visible transitions between shades).
- Vignetting (an abrupt transition between top and bottom colors, compressed in the middle of the image).
- Fringing (in which two colors overlap and mix at their borders).
- Jaggies or fuzziness on text or graphics.
- Poor color balance (a red, green, or blue cast on gray gradient backgrounds).
- Inconsistent color density.
- Poor color saturation.
- Noticeable distortion.

During the judging, the panelists discussed the problems inherent with judging color, and why comments such as "That red is wrong" were inappropriate. We provided space for comments about any unlisted problems the judges spotted and for positive feedback they wished to voice. Finally, we asked them to give the recorder or service an overall score.

We chose to emulate the conditions of the type of small-to-medium sized conference room that you typically find, including using standard projection equipment. The slides were projected using a Kodak Ektagraphics III B projector equipped with an Ektagraphics Projection FF 76mm f/3.5 lens onto a Da-Lite Model L screen approximately 10 feet away. We seated our panel of judges approximately 15 feet from the screen, and refocused the projector as necessary. ■

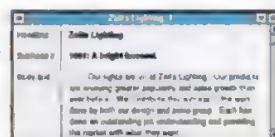


Desktop publishing on your PC is about to see the light of a new day: with Aldus PageMaker® 4.0

for Windows. Put the two together and you can produce a wider range of documents more easily and cost-efficiently than ever before.

Like long documents, New PageMaker automates page-numbering, indexing, and the table of contents. What's more, with new Links management, you can automatically update

your documents with the latest versions of text, spreadsheets, tables, databases, and graphics. Plus,



The new Story Editor is a powerful, built-in word processor that can enter and edit text, check spelling, and search and replace.

files are compatible across Macintosh, DOS, and OS/2 platforms.

New PageMaker also includes a host of new graphics capabilities. For instance, you now have the ability to expand or condense type, rotate it 90°, and wrap it around irregular objects. Plus there's true track kerning, and 24-bit color TIFF image support.

To change the course of your PC's life, call 800-333-2538, Dept. 10L, for a free brochure, or a \$9.95 working model.* To upgrade, call 800-243-3173, Dept. 10U.



ALDUS
The Creative Edge
in Business

PageMaker 4.0 for Windows.

Today is the first day of the rest of your PC's life.

CIRCLE 196 ON READER SERVICE CARD

*Offer good only in U.S. and Canada for as long as supplies last. The following are registered trademarks of the companies listed—Aldus, the Aldus logo, and PageMaker: Aldus Corporation, Macintosh: Apple Computer Inc. The following are trademarks of the companies listed—Windows: Microsoft Corporation, OS/2: International Business Machines Corporation. ©1991 Aldus Corporation. All rights reserved.

GRAPHICS

FILM RECORDERS



PERFORMANCE TESTS: FILM RECORDERS

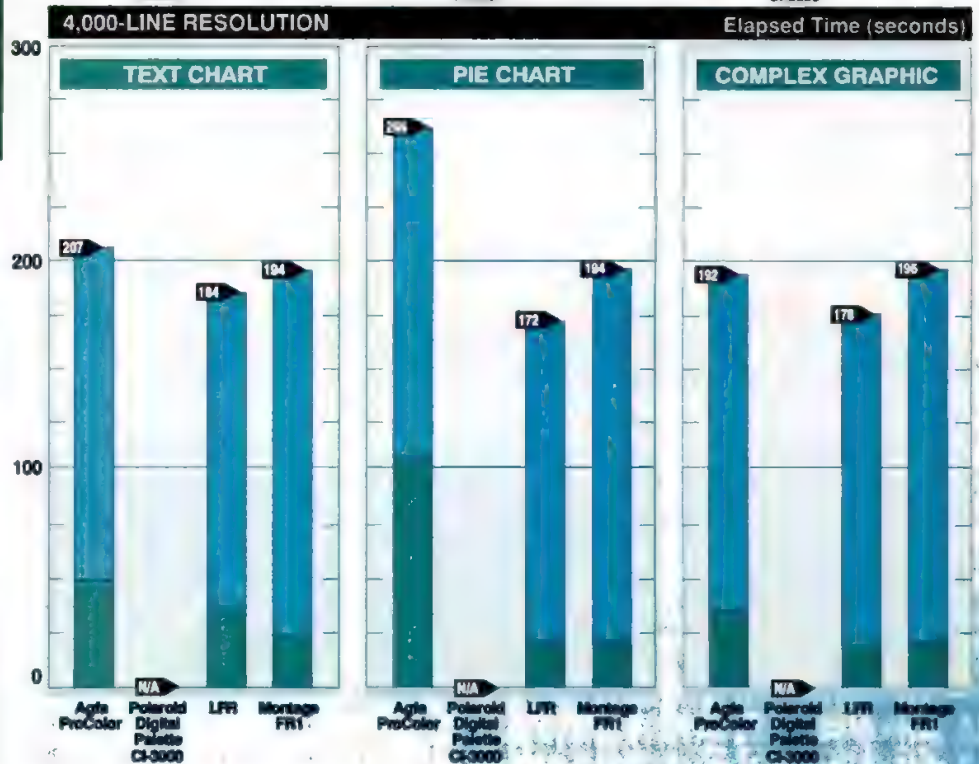
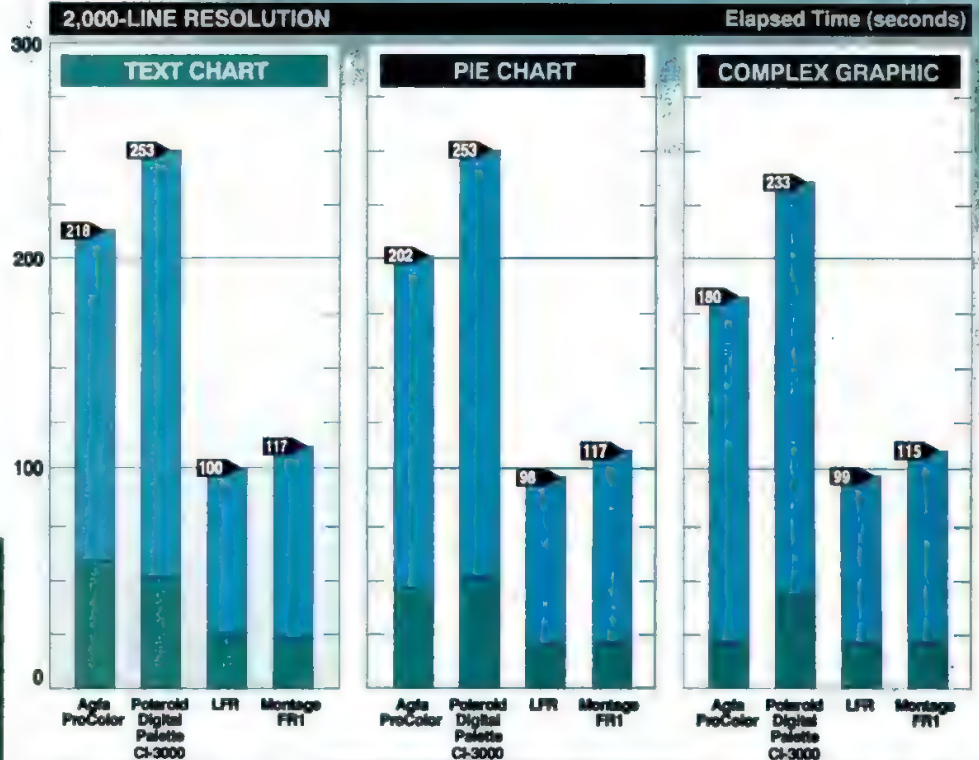
The combination of efficient rasterizing and fast imaging hardware gives Lasergraphics' LFR a clear performance lead over the rest of these recorders, although Presentation Technologies' Montage FR1 comes in a strong second.

All tests were performed on a Compaq Deskpro 386/25 with 4MB RAM. The recorders were set in their default configurations, and the test files used the standard hardware fonts built into the recorders. We created the test files using *Harvard Graphics*, and we recorded each image on film directly from that software if the proper drivers were available. We ran each test at both 2,000- and 4,000-line resolutions.

The **Text Chart** test measures the time the film recorder takes to produce a slide showing a two-column bullet chart with a red-to-black gradient background. The test-file size is 7K.

The **Pie Chart** test measures the time the film recorder takes to produce a six-slice pie chart slide that also includes a bitmapped logo, small text annotation, and a green-to-black gradient background. The test-file size is 12K.

The **Complex Graphic** test measures the time the film recorder takes to produce a slide of a vector image with over 100 objects on a gray-scale gradient background. The test-file size is 15K.



N/A—Not applicable: The Polaroid Digital Palette CI-3000 does not support this resolution.

GRAPHICS FILM RECORDERS

FILM RECORDERS: COMPOSITE VIEW

The time a film recorder takes to generate an image on a frame of film can be broken into two components: rasterizing time and exposure time. In our tests, we measured rasterizing time from the initiation of the print command until the camera shutter opened (first shutter click). Exposure timing began at the moment the shutter opened to begin imaging, and ended when the shutter closed (second shutter click).

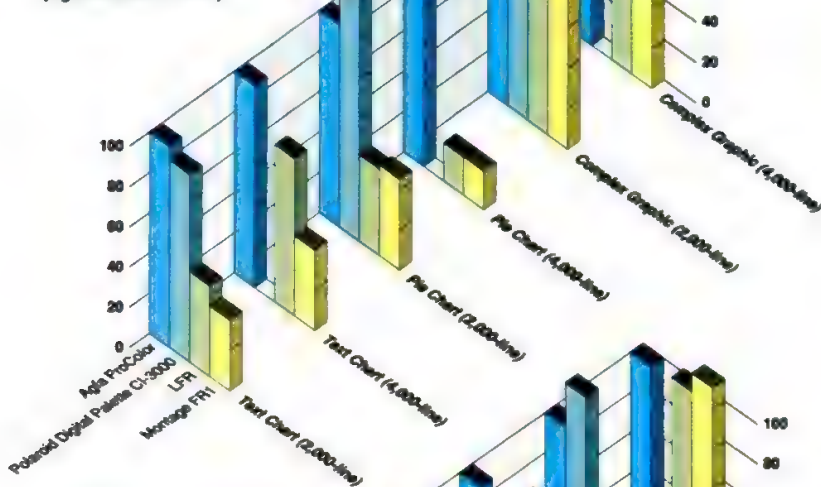
Uncoupling the rasterizing from the exposure time allows us to separate the overhead the driver incurs from the time the recorder takes to generate the image on film. Exposure took up at least 75 percent of the total imaging time in our tests; this is the most important factor in a recorder's overall speed. But exposure times vary little within a given resolution. They are defined rather closely by the speed of the film and the resolution setting. Note, too, that imaging at 4,000-line resolution does not necessarily take twice as long as imaging at 2,000-line resolution.

Rasterizing times, by contrast, vary among recorders according to the efficiency of their rasterizing algorithms (including driver overhead), the memory configuration, and the speed of the processor doing the rasterizing. The close similarity in rasterizing speeds between the LFR and the Montage FR1 should come as no shock, as they both use the same Motorola 68000-based Rascol II coprocessor board with the same set of drivers; the 5- to 22-second differences in total imaging time are predominantly due to differences in exposure time. The Agfa ProColor, which also relies on a coprocessor board, clocks in with relatively poor rasterizing times because it speaks SCODL, a more complex and capable language than the Lasergraphics Language used by the Rascol II.

The one unit without a coprocessor board, the Polaroid Digital Palette CI-3000, was predictably the slowest. In fact, even at 2,000 lines, the CI-3000 usually took longer than the other recorders at 4,000 lines. The bulk of the performance difference, however, is a result of its longer exposure times, which are imposed by its use of 33 bits per pixel rather than the standard 24 bits per pixel. Its slower parallel interface is also a factor.

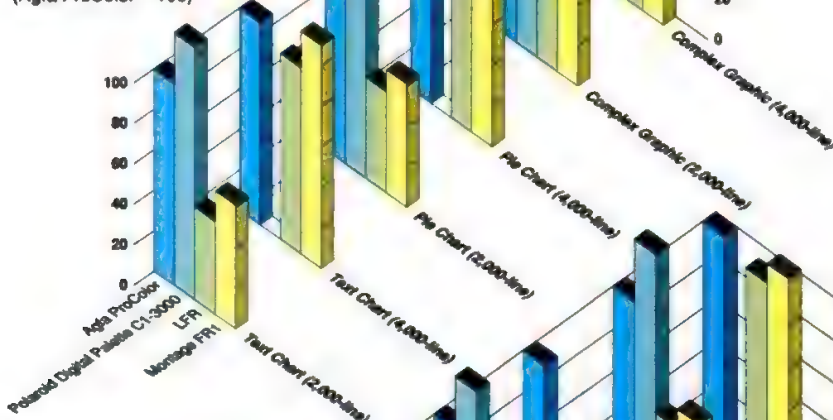
RASTERIZING TIME

Relative Times
(Agfa ProColor = 100)



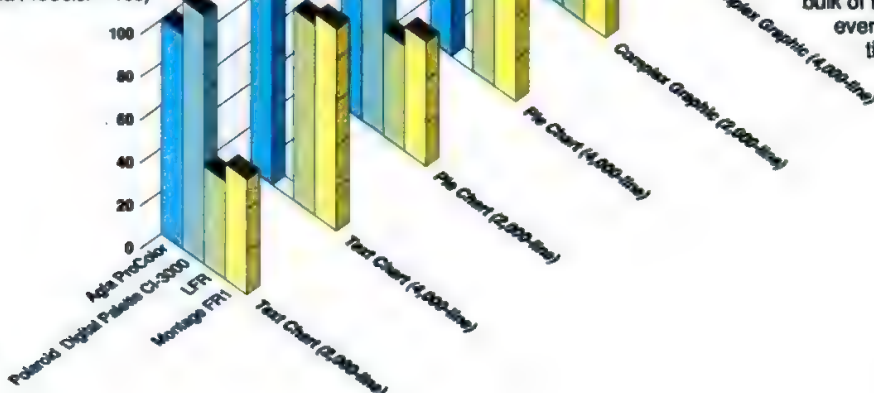
EXPOSURE TIME

Relative Times
(Agfa ProColor = 100)



TOTAL TIME

Relative Times
(Agfa ProColor = 100)



**Pop-up.
Powerful.
Easy.**

hDC MicroApps. Ready to use in an instant—when you're in the middle of a Windows program.

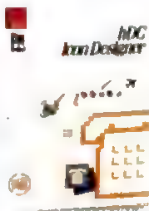


hDC FirstApps.™
Nine MicroApps that customize and enhance your Windows system. Get a graphical view of your system memory, turn your desktop background into a calendar and much more.
Suggested Retail Price \$99.95*



hDC FileApps.™
The Windows file utilities you need—when you need them. A set of five powerful MicroApps that lets you take care of essential file

operations quickly and easily. Undelete files instantly, find files fast, graphically view your hard disk, encrypt files and more.
Suggested Retail Price \$129.95*



hDC Icon Designer.™
Create and modify icons for Windows Program Manager with the Icon Editor. Store and manage your icons in easy-to-use graphical libraries.

Suggested Retail Price \$59.95*

Call 800.321.4606 for more information and the name of the hDC Dealer nearest you.**



hDC Computer Corporation
6742 185th Avenue NE
Redmond, Washington 98052

*Suggested US retail price. **hDC products are distributed worldwide; call 206.885.5550 for the distributor in your country. © Copyright 1991, hDC Computer Corporation, hDC FileApps, FirstApps, Icon Designer and MicroApps are trademarks of hDC Computer Corporation. Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

GRAPHICS FILM RECORDERS

first image and continues to wind through the roll as you shoot. Mercifully, there is no need to attend to exposure buttons or other manual settings.

The optional instant 4- by 5-inch transparency back is less convenient to use. For instance, an amber light goes on over the exposure button after the image is rasterized, but nothing happens until you push the button to start the exposure; this step should be automatic. Furthermore, while the amber LED blinks during exposure, it does not blink at a consistent rate, so it's hard to determine when the recorder is actually finished imaging.

NOT AN EASY TRICK

In general, the Montage is not easy to operate, even with technical assistance. Like Lasergraphics' LFR, the Montage includes software that lets you change camera-back parameters and adjust such settings as film type, color intensity, and resolution. You can also switch between support for a full 16.7 million colors and a faster draft mode that uses only 2 million.

All of these operations are simple enough, but a shortage of status indicators makes it too easy to go wrong; for example, if you mistakenly set up the wrong film for the camera back, there is no prompt to tell you that you've taken a false step. If you decide to change anything on the options menu, you must exit your application, call up the software, make your changes, run a batch file, and then go back to your graphics package, making sure that the changes you have made in the Montage's options menu correspond to your application's setup. This can be inconvenient if you are in the habit of making proofs before shooting your slides.

Installing the Montage and trying to use it with graphics applications pointed up the weaknesses of its skimpy documentation. The manual is easy to follow, even for the novice, but it often falls short in answering questions. Presentation Technologies increased its warranty from an inadequate 90 days to one year during our test, but it discontinued its toll-free tech support number at about the same time, so getting answers will cost you.

HIGH-QUALITY SLIDES

Operational complaints aside, the slides we produced with the Montage were generally of high quality, with good color saturation, legible text, and no vignetting.



Montage FR1

Presentation Technologies, 779 Palomar Ave., Sunnyvale, CA 94086; 800-782-2543, 408-730-3700.

List Price: \$6,995 (includes Rascol II rasterizer board and 35-mm. camera back). PostScript option (*Freedom of Press*), \$495; Microsoft Windows 3.0 driver (*SuperPrint*), \$395. TC1 camera back (669 and 691 film), \$895.

Requires: 286-based PC or better, DOS 2.0 or later. 2MB RAM recommended.

In Short: The Montage FR1 offers a fine combination of quality and performance. Though its complexity and terse indicators make it less practical than the Polaroid for desktop use, it is a good choice if you need something closer to a professional-level film recorder—and are willing to pay for it.

CIRCLE 426 ON READER SERVICE CARD

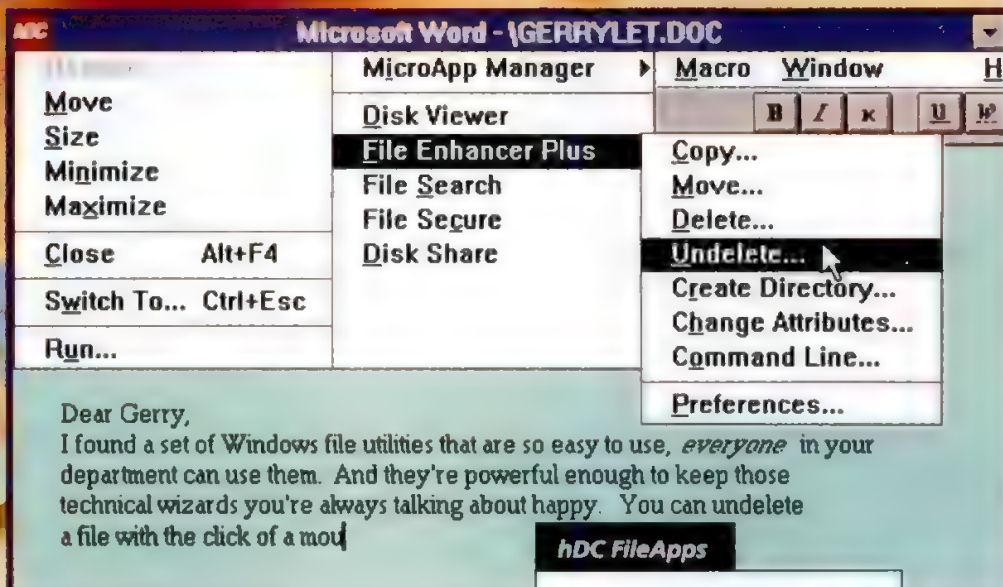
We observed a few jaggies at 2,000-line resolution and some slight banding on gradient backgrounds. But these effects diminished or disappeared entirely at 4,000-line resolution, leaving only a slight hint of banding on our gray-scale gradient test slide, and some minimal fringing on graphics. (The Presentation Technologies staff suggests reducing the color intensity to 80 percent to make any potential overlap imperceptible.)

Operational speed is also good. Our test slides were all imaged in 3 or 4 minutes. Since the timings at 2,000-line and 4,000-line resolutions differ by only about a minute, you might prefer to stick to the finer resolution.

Though we got good results in the end, our experiences with the Montage FR1 underscore the idea that purchasing a film recorder is far from a turnkey proposition. The Montage offers a good balance of image quality and performance, and can be a solid choice if you are looking for something approaching a professional film recorder. But for utility and value on the desktop, most users will do better with the Polaroid.

Lori Grunin is the project leader in charge of graphics testing at PC Magazine Labs. Alfred Poor is a contributing editor of PC Magazine. John R. Quain is a contributing editor of Video Review and a frequent contributor to PC Magazine.

Now you can
undelete a file
in the middle
of a sentence.



Or search for a file in the middle of a recalculation. Or encrypt a file in the middle of a newsletter layout.

All you need is hDC FileApps.[†] This collection of five powerful MicroApps for Microsoft Windows

lets you perform essential file operations quickly and easily—without leaving your current Windows application.

Need to copy a file? Don't waste time switching to File Manager. Just pop up File Enhancer Plus and copy away. Want to see how your hard disk space is being used? Simply click on Disk Viewer and there it is—right down to the last byte.

FileApps does even more than that for even less than you'd expect—just \$129.95*. Call today to find out more. And get the powerful Windows file utilities that are as easy to use as they are to access.

"FileApps' availability to all applications makes using it additive."

Paul Bonner, PC Computing **

Call 800.321.4606 for more information and the name of the hDC dealer nearest you.

hDC FileApps

File Enhancer Plus Undelete, copy, move, and delete files, change file attributes, create directories, and enter DOS commands directly from your system menu

Disk Viewer Graphically view your hard disk usage and open or delete files—perfect for quick disk clean-up on local or network drives

File Search Find any file fast, based on file name, file contents, date/time, or standard group search parameters

File Secure Quickly and easily encrypt files to prevent unauthorized access, using full DES encryption or Quick Encryption

Disk Share Developed by Traveling Software, allows you to share files between computers—perfect for using, and transferring files between a laptop and a desktop computer



hDC Computer Corporation
6742 185th Avenue NE
Redmond, Washington 98052

CIRCLE 528 ON READER SERVICE CARD

* Suggested U. S. retail price ** Reprinted from PC Computing, January 1991 © 1991 Ziff Communications Company

[†] hDC products are distributed worldwide, call 206 885 5550 for the distributor in your country

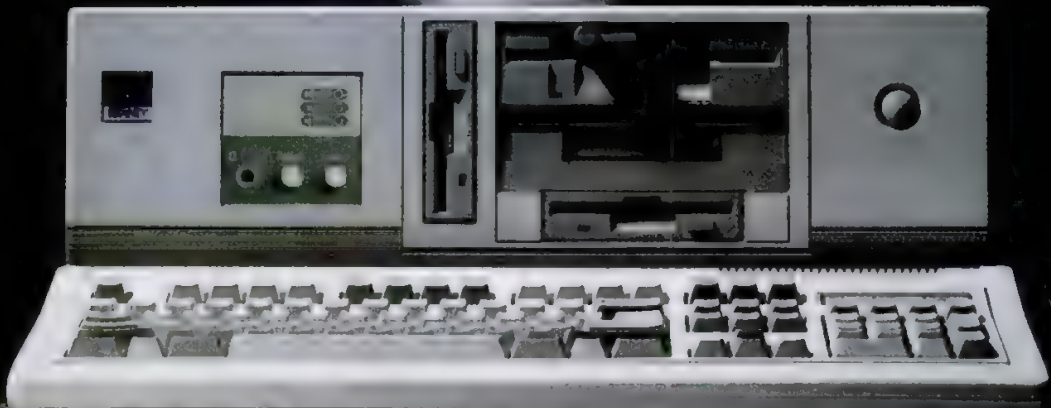
© Copyright 1991, hDC Computer Corporation. hDC FileApps and MicroApps are trademarks of hDC Computer Corporation. Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation. Traveling Software is a registered trademark of Traveling Software, Inc.

Rock Solid Support,

Introducing Service Plus

OUR NEW 5-YEAR EXTENDED
WARRANTY PLAN (PC350000)

- GUARANTEED TRADE-IN:
When you upgrade to a newer
personal PC, your old system
- 100% ON-SITE PARTS
AND LABOR COVERAGE
FOR 5 FULL YEARS
(Not for Desktop and Printer
12 Year Plan Also Available)



PC BRAND

Rock Bottom Price.

"The Best Low Cost Alternative Around"

PC Magazine,
PC Brand 386/25,
Product Review



"...Flawless Compatibility, Lowest Price."

InfoWorld,
PC Brand 386/33,
Product Review

386/25 Non Cache and 386/33 Cached ISA Systems

386/25 Non Cache Base System 386/33 Cache Base System

Customize with the Video and Hard Drive options of your choice

- True 25MHz or 33MHz Intel 80386 CPU operating with Zero Wait States
- Landmark Speeds:
33.6MHz (386/25 Non Cache)
58.7MHz (386/33Cache)
- Norton SI 28.2 (386/25 Non Cache)
45.9 (386/33Cache)
- 1MB RAM (expandable to 16MB)
- 1.2MB or 1.44MB Floppy Drives
- 101 Key Click/Tactile Keyboard
- 1 Parallel and 2 Serial Ports

25MHz **\$1,249**

33MHz Cache **\$1,499**

386/25 Non Cache SVGA Package 386/33 Cache SVGA Package

This preconfigured package includes all the features of our base system with:

- 4MB RAM (expandable to 16MB)
- 89MB/19MS Hard Drive (386/25 Non Cache)
- 125MB/19MS Hard Drive (386/33 Cache)
- 14" Super VGA (1024 x 768 Resolution) Color Monitor
- 16 Bit High Performance Super VGA Card with 1 MB Video RAM
- 1.2MB and 1.44MB Floppy Drives
- High Resolution Mouse

25MHz **\$2,672**
Lease: \$103/month*

33MHz Cache **\$3,068**
Lease: \$118/month*

All Systems also Include: On-Site Service by TRW, Our Unique 5 Year Warranty, Unlimited Toll-Free Service and Support, Our 60-Day** No Risk Money Back Guarantee, Volume Purchase Discounts, and Tech Support Bulletin Board.

PC Brand Will Customize Any System to Your Exact Specifications, with name brand products from vendors like NEC, Paradise, ATI, Novell and many others, at outstanding prices. Call for quotation.

Leasing Plans Available through Eaton Financial Corp., A Subsidiary of AT&T Credit Corp. *Monthly Payment Based on 36 Month Lease.

Standard Features

- True 25 or 33MHz Intel 80386 CPU Operating with Zero Wait States
- Direct Map Cache Processor with 64K Static RAM on 386/33 Cache System
- 1MB RAM expandable to 16MB on the System Board
- 1:1 interleaved Hard/Floppy Drive Controller, with 1MB/second disk transfer rate
- 1 Parallel and 2 Serial Ports
- High capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 387™ or Weitek Co-Processor Support

- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, UNIX, NOVELL, 3COM, and PCNET compatibility
- 8 Slot Motherboard Design (7 16bit & 1 8bit for 386/25) (6 16bit & 2 8bit for 386/33 Cache)
- Medium Footprint Desktop Case with 6 Disk Drive Bays

Hard Drive Options

- 44MB/28MS
- 89MB/19MS
- 125MB/19MS
- 177MB/15MS
- 200MB/16MS
- 320MB/16MS
- 640MB/16MS

Case Options

- Slim Line
- Mini Tower
- Full Size Tower

Video Options

- Mono Graphics
- VGA Mono
- VGA Color (640 x 480)
- Super VGA Color (1024x768)

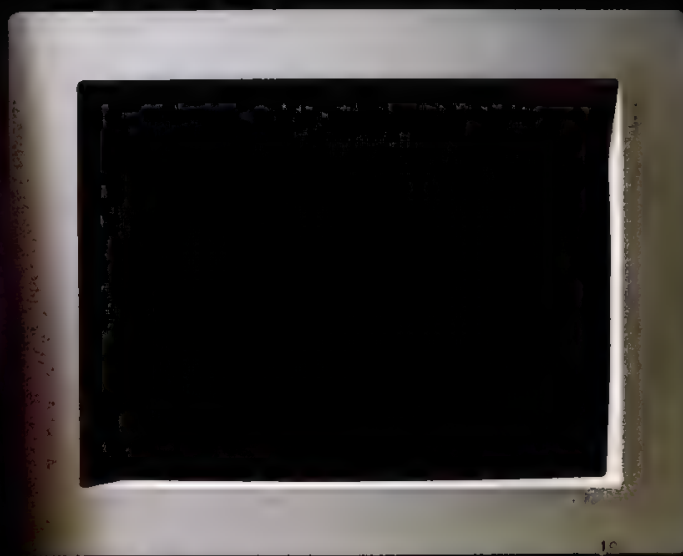
Call 1-800-PC Brand

TEL 1-800-722-7263 FAX 1-800-722-7392

PC Brand, Inc. 877 Supreme Drive, Bensenville, IL 60106
International Fax #708-616-2888 International Voice #708-860-2300.
We are open Mon. thru Fri.: 7am to 7pm; Saturday 8am to 4pm Central Time.
MasterCard, VISA, Discover, PC Brand Direct Advantage MasterCard, Checks
& Approved P.O.s Accepted. Prices & specifications subject to change.

386, 387, SX, and 486 are Trademarks of Intel Corporation

Rock Solid Service,



PC BRAND

Rock Bottom Price.

486/25MHz and 486/33MHz Cached ISA Systems

Service Plus

OUR NEW 5-YEAR
EXTENDED WARRANTY
PLAN INCLUDES:

GUARANTEE
TRADE-IN
FREE ON-SITE
PARTS AND
LABOR COVERAGE
FOR 5 FULL YEARS

See the Service and Pricing
12 Year Plan, Also Available

486/25 and 486/33 Base Systems

Customize with the Video and Hard Drive
options of your choice

- True 25MHz or 33MHz Intel 80486 CPU operating at Zero Wait States
- Landmark Speeds:
114.1MHz (486/25), 150MHz (486/33)
- Norton SI 41.5 (486/25), 51.5 (486/33)
- 1MB RAM (expandable to 32MB)
- 1.2MB or 1.44MB Floppy Drive
- 101 Key Click/Tactile Keyboard
- 1 Parallel and 2 Serial Ports

25MHz **\$1,949**

33MHz **\$3,399**

486/25 and 486/33 Super VGA Packages

This preconfigured system includes all the
features of our base systems with:

- 4MB RAM (expandable to 32MB)
- 125MB/19Ms Hard Drive
- 14" Super VGA (1024 x 768 Resolution)
Color Monitor
- 16 Bit High Performance Super VGA Card
with 1MB Video RAM
- 1.2MB and 1.44MB Floppy Drives
- High Resolution Mouse

25MHz **\$3,518**

Lease: \$135/month*

33MHz **\$5,038**

Lease: \$176/month*

All Systems also include: On-Site Service by TRW¹, Our Unique 5 Year Warranty, Unlimited Toll-Free Service and Support, Our 30-Day No Risk Money Back Guarantee, Volume Purchase Discounts, and Tech Support Bulletin Board.

PC Brand Will Customize Any System to Your Exact Specifications, with name brand products from vendors like NEC, Paradise, ATI, Novell and many others, at outstanding prices. Call for quotation.

Leasing Plans Available through Eaton Financial Corp., A Subsidiary of AT&T Credit Corp. *Monthly Payment Based on 36 Month Lease.

Standard Features

- True 25MHz or 33MHz Intel 80486 CPU Operating at Zero Wait States
- 1MB RAM expandable to 16MB
- Built-in 8K 4-Way Set Associative Cache
- Built-in Intel 487 Numeric Coprocessor
- Optional 128K or 256K auxiliary CPU Cache Card
- Optional Weitek Card
- 1:1 Interleaved Hard/Floppy Drive Controller, with 1MB/second disk transfer rate
- 1 Parallel and 2 Serial Ports
- High capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery

- 8 Slot Motherboard Design (7 16bit & 1 8bit)
- Industry Standard BIOS with full MS/DOS, OS/2, XENIX, UNIX, NOVELL, 3COM, and PCNET compatibility
- Medium Footprint Desktop Case with 6 Disk Drive Bays

Hard Drive Options

- 44MB/28MS
- 69MB/19MS
- 125MB/19MS
- 177MB/15MS
- 200MB/18MS
- 320MB/16MS
- 640MB/16MS

Case Options

- Slim Line
- Mini Tower
- Full Size Tower

Video Options

- Mono Graphics
- VGA Mono
- VGA Color (640 x 480)
- Super VGA Color (1024x768)

Call 1-800-PC Brand

TEL 1-800-722-7263 FAX 1-800-722-7392

PC Brand, Inc. 877 Supreme Drive, Bensenville, IL 60106
International Fax #708-618-2888 International Voice #708-890-2300.
We are open Mon. thru Fri.: 7am to 7pm; Saturday 8am to 4pm
Central Time. MasterCard, VISA, Discover, PC Brand Direct
Advantage MasterCard, Checks & Approved P.O.s Accepted. Prices
& specifications subject to change. 386, SX, 387, 486 are
Trademarks of Intel Corporation.

¹TRW-National Computer Maintenance Services-Free on site service for 386/SX, 386/DX, and 486's for customers located within a 100 mile radius of any of over 200 TRW service centers. On site service for 286's available at extra cost. Call for details.

"The PC Brand
486/33 showed
better speed and
expansion than
machines costing
twice as much.
For a good number
of users, the search
for a 486/33 will
end with this
machine."

PC Magazine,
PC Brand 486/33,
Product Review

Copam Cares for You and Your Business's Health

Copam is a worldwide pioneer in personal computer development and manufacturing. We're proud to introduce the first affordable low radiation VDT system, using the latest technology and ergonomic design.

Copam's reputation in customer satisfaction covers the globe—we manufacture a complete line of products, including personal computers, monitors and workstations, from XT's to the ultimate EISA 486.

Copam cares for your business's health and success. We provide you with an array of products and support programs. Call us today to learn how you can benefit from this healthy opportunity. 1-800-828-4200.

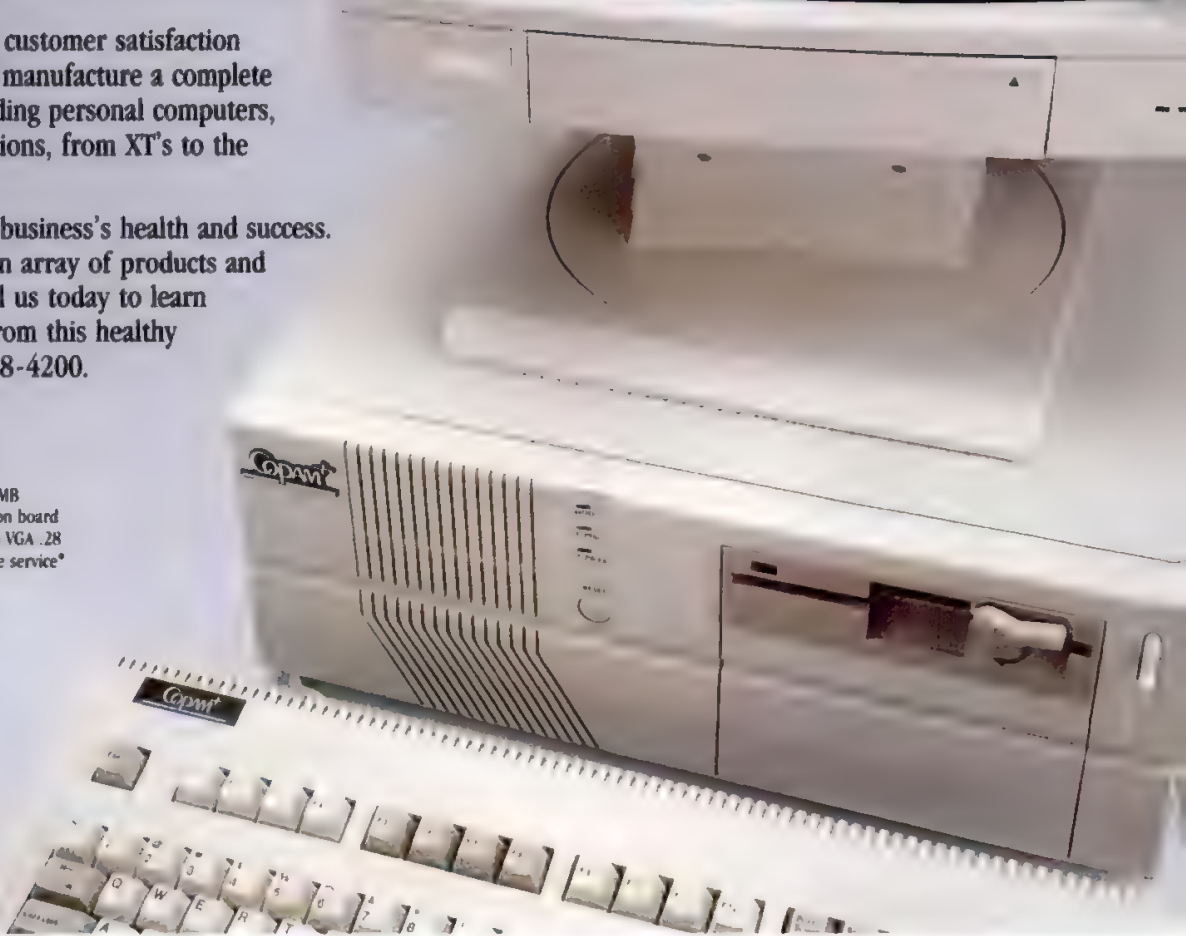
Introductory Offer:

- 386SX 16 MHz ■ 1 MB Exp. to 8 MB
- 1.2 MB Floppy ■ EVGA 800X600 on board
- Low Radiation Monitor 14" Mono VGA .28
- DOS 4.01 ■ TRW one year on site service*

only \$1249 MSRP

Monitor Included

(Color VGA System only \$1,499
Available Feb. 1991)



PC 286 M/12



PC 386 V/33 EISA
PC 486 V/25 EISA



PC 386 SXB/16
PC 386 B/25
PC 486 B/25

COPAM⁺ USA[®]

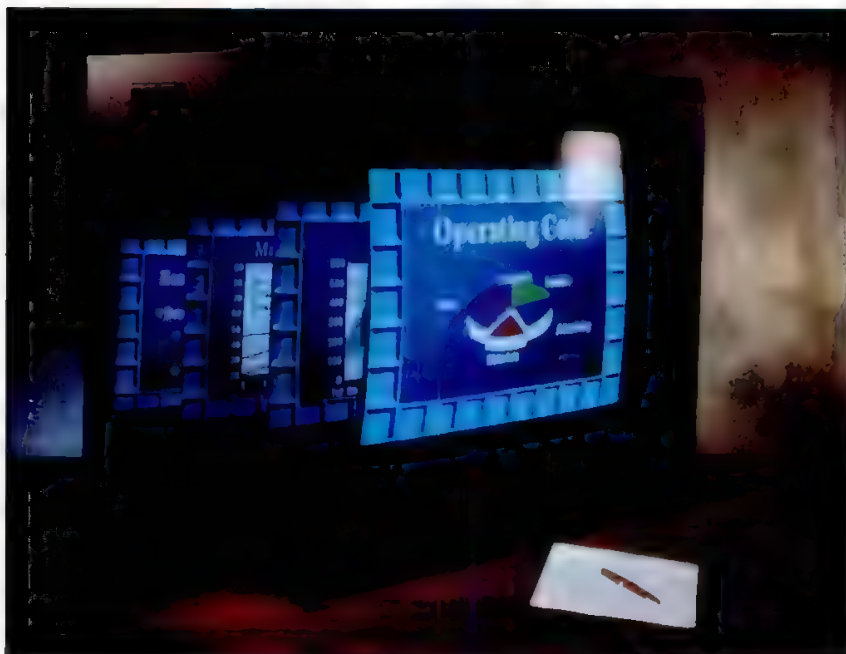
Healthy People Healthy Business[™]

CIRCLE 372 ON READER SERVICE CARD

45875 Northport Loop East Fremont, CA 94538
(415) 623-8911 FAX: (415) 623-8551

Copam Canada: Tel: 1-416-670-0333 FAX: 1-416-670-0004

*most United States locations



Presentation Monitors

by Alfred Poor

Tired of watching your meetings turn into a contact sport as people jostle to view your 20-inch display? *PC Magazine* reviews nine 25- to 35-inch monitors that will let your audience keep their seats.

This seems to be the year of the incredible expanding monitor. Last year's 14-inch display has suddenly sprouted into a 16-inch monitor. (See the March 26, 1991, issue of *PC Magazine*.) There probably is a ceiling on desktop-display size: More than 17 inches and you have the monitor that ate Manhattan chomping up your desktop real estate. But when it comes to presentations, it's hard to imagine a screen that's too big: Witness the new 23-by-32-foot Sony JumboTron, made up of 560 CRTs currently on display in Times Square. For most PC business presenters, however, the nine monitors reviewed here—with diagonal screen sizes between 25 and 35 inches—will do the trick.

The monitors in this article are not projection systems; they are all based on conventional CRT (cathode ray tube) technology. While their designs aren't particularly new, these displays are the vehicles that will deliver all of today's hot graphics software (desktop presentations, multimedia, and interactive business graphics) to the people you are really trying to impress: the people in the meeting rooms, the lecture halls, and the boardrooms. You won't score any points with a client or superior by making that person crowd around a 14-inch display with 5,

10, or 15 other guys in worsted wool suits.

Monitors this size typically have a different mission than single-user monitors. Designed for applications that display images to a group of people, they don't need to support high-resolution modes because you will not be using fine-detailed images. And since not every conference room is equipped with the latest hardware, compatibility with EGA signals is important.

We built our review criteria around

these user requirements. To make it into this article, a monitor had to have a diagonal screen size 25 inches or bigger, provide support for VGA as well as EGA, and arrive in working condition in time for testing. Most of the monitors can also accept the NTSC video signal.

The nine displays that meet our qualifications are: the Barco Multidata OCM 2846, Multidata OCM 3346, and Multidata SCM 2846; the Mitsubishi AM-3151A, AM-3501R, HC3505SK, XC-3310C, and XC-3715C; and the NEC DM-3000P. Note that two separate divi-

UNDERSTANDING YOUR MONITOR: A Guide to Video Terms

by Robin B. Bornstein
and Oliver Rist

ASPECT RATIO The aspect ratio is the proportion of a pixel's width to its height. In VGA and Super VGA mode, this ratio is 1:1, which means the pixels are as tall as they are wide.

AUTOSIZING True autosizing occurs when a monitor can maintain a constant image size when moving across low and high resolutions. Many monitors use preprogrammed factory settings to achieve a similar effect, but only for certain resolutions—usually VGA and Super VGA.

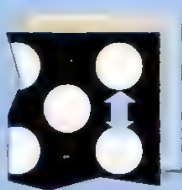
BARREL DISTORTION Barrel distortion occurs at the edges of the screen and is the inverse of pincushioning. The sides of an image afflicted with this type of distortion seem to bow out, resembling a barrel.



the result is pure white. Serious deviation from this harmony (mainly due to the relationship of the electron beams to each other) results in poor convergence. This can cause white pixels to show bits of color and can also decrease both picture sharpness and resolution.

CONVERGENCE

Theoretically, each of the beams that generate the three color dots (red, green, and blue) should converge at appropriate distances from one another. When all three dots are being excited simultaneously and their relative distance is perfect,



The smaller the dot pitch, the finer the image's "grain." Some monitors use a shadow mask perforated by strips, not holes. In this case, the dots are arranged in a linear fashion, and their density is called "striped dot pitch."

DRIFT Drift, jitter, and swim are all terms that relate to an unwanted motion of a line. The only difference between the three terms is the amount of time we use to measure each one. PC Magazine Labs' Microvision Superspot testing apparatus measures drift in 1-minute intervals.

HORIZONTAL SCAN FREQUENCY This is the frequency per second at which a monitor repaints the horizontal lines that make up an image. Horizontal scan frequency is measured in kHz; a standard VGA signal requires a 31.5-kHz horizontal scan frequency capability.



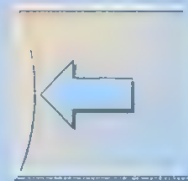
passes, painting every other line on the first pass and filling in the rest of the lines on the

DOT PITCH Dot pitch describes the distance between the holes in the shadow mask; it therefore also indirectly describes how far apart the individual dots are on-screen.

second pass. Noninterlaced scanning, on the other hand, paints all the lines in one pass and then paints an entirely new frame. Noninterlaced scanning is preferable because it reduces screen flicker; it is, however, more expensive.



PINCUSHIONING Pincushioning describes an unwanted curve of an image and usually occurs at the edges of the screen. The sides of an image afflicted by pincushioning appear to curve inward, as though someone were poking the image from off-screen.

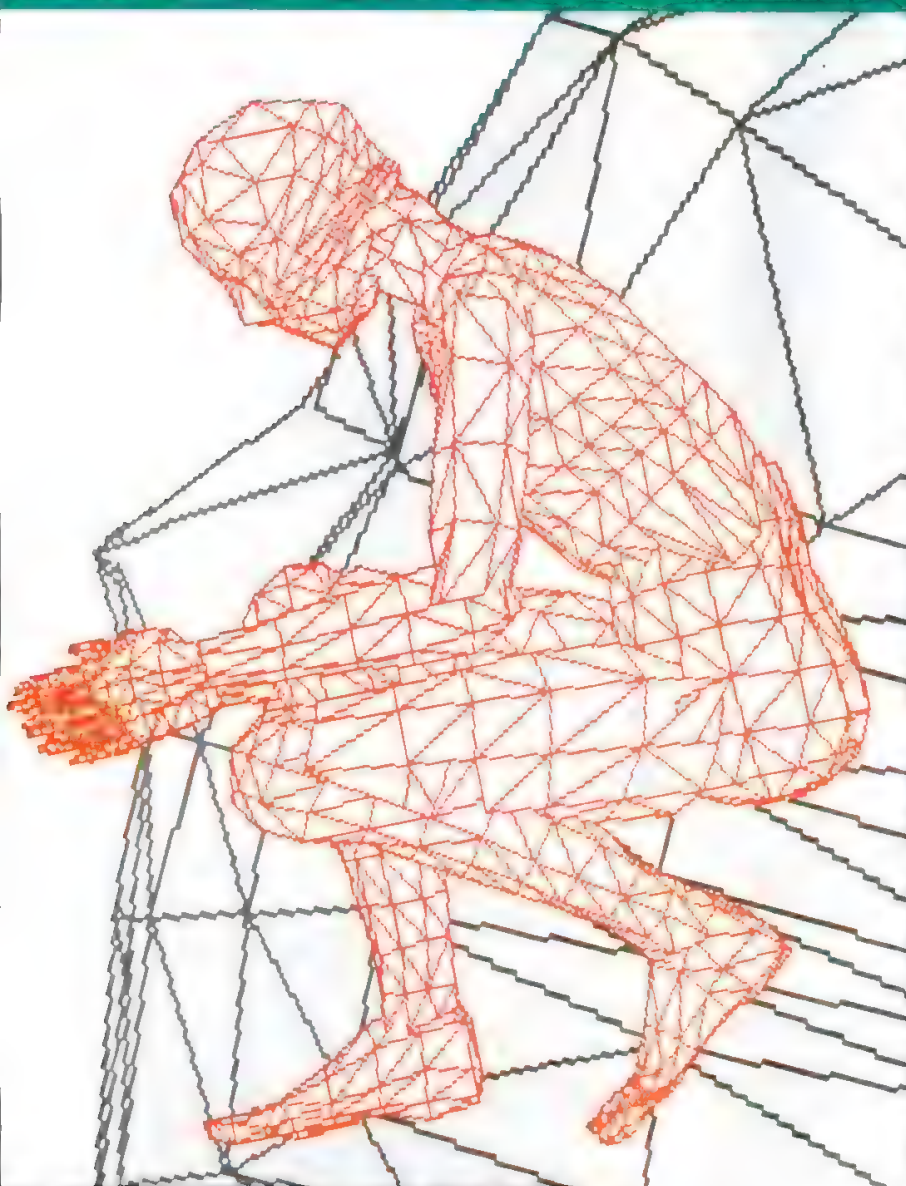


ROPING Lines are described as roped when they appear in a twisted or rope-like fashion instead of solidly straight. Roping is due to poor convergence.

VERTICAL REFRESH RATE OR VERTICAL SCAN FREQUENCY The vertical refresh rate, also called vertical scan frequency, is related to horizontal scan frequency in that once an image has been entirely repainted (by horizontal sweeps), it has been vertically scanned or refreshed. Vertical refresh rates, measured in Hz, increase screen flicker if they are slow.

VIDEO BANDWIDTH Video bandwidth represents the highest input frequency a monitor can handle; thus, it determines the resolutions of which a display is capable. Video bandwidth is measured in MHz. ■

INTRODUCING MANNEQUIN™..DRAWING & DESIGN ON A MORE HUMAN SCALE.



Most designs are for people. But most drawing and design programs don't let you see how designs work with people.

Until now. Introducing Mannequin,™ a revolutionary new software program that actually lets you put people in your designs and drawings.

Using extensive ergonomic data, advanced technology and graphics, Mannequin lets you develop moving, fully dimensional 3D human likenesses that can see, walk, bend, and grasp objects.

With Mannequin, you can have people walk through your buildings. Work in your factory. Use your product. You can even see what a person would see from any point in an environment!

The result—you can produce better presentations and designs because they take the people who use them into account.

Mannequin works with AutoCAD,® Generic CADD,® and most other PC CAD packages, as well as with most popular graphics programs, such as Micrografx® Designer,™ Corel Draw,® PC Paintbrush,® Harvard Graphics,® and Aldus Pagemaker.®

To find out more, or for the name of your Mannequin dealer, call us toll-free at 1-800-437-4441.

And add a human touch to your designs.



HUMANCAD

1800 Walt Whitman Road
Melville, New York 11747

Tel: 516-752-3568

Fax: 516-752-3507

Image created by Gary Yost. Mannequin was exported via DXF into Autodesk 3D Studio.®

CIRCLE 260 ON READER SERVICE CARD

Copyright 1991 Biomechanics Corporation of America. All rights reserved. Mannequin is a product and trademark of the HUMANCAD division of Biomechanics Corporation of America. All other company and product names are trademarks or registered trademarks of their respective companies.

HARDWARE

PRESENTATION MONITORS

sions of Mitsubishi are represented in this field: the Information Systems Division and the Professional Electronics Division. These two divisions have separate product lines with different feature sets.

Other monitors were not included here, for a variety of reasons. Some 25-inch or larger monitors were excluded because they couldn't handle the digital EGA signal. The Mitsubishi HJ-3505 was left out because it is a high-resolution data monitor and can't accept VGA. The Mitsubishi MA-2751A would have fit our requirements, but due to inventory shortages, the company was unable to provide us with an evaluation unit during our testing period.

BIG-SCREEN ALTERNATIVES

Another common feature these monitors share is a steep price tag; list prices range from a little under \$4,000 to over \$11,000. It is important to note that if these numbers make your eyes bulge, there are alternative ways to display your PC's images to a group. The different solutions, however, present other combinations of advantages and disadvantages.

For starters, you can use an LCD projection panel on an overhead projector and possibly save some money (see "LCD Panels: 12 for the Road," *PC Magazine*, February 27, 1990). Overhead projectors are fairly bright, in spite of all the light absorbed by the LCD, and the panels' light weight makes them easy to set up and move. Unfortunately, color LCD panels remain extremely expensive and do not yet approach CRTs in terms of the range and quality of colors displayed. Two such color

LCDs are the \$4,795 Proxima VersaColor II, Model A722C, from Proxima Corp. of San Diego, California (see First Looks, September 25, 1990) and the \$5,995 5000CX PC Viewer from In Focus Systems of Tualatin, Oregon (see First Looks, December 25, 1990).

Monochrome LCD—and so-called simulated color (which uses two or more colors with fill patterns to simulate full color)—panels are more affordable but naturally lack the impact of a full-color display. But if you don't need color, you might look at the PC-9601 and PC-9700 (\$1,898 and \$2,746, respectively) from Apollo Audio Visual of Ronkonkoma,

New York; the Looking Glass 480 (\$1,895) from Chisholm of Campbell, California; In Focus Systems' 480CX (\$4,495); or the ViewFrame II+2 (\$1,995) from nView Corp. of Newport News, Virginia. There are also new LCD projectors on the market, but they do not support VGA resolutions, and their picture quality is not yet equal to that of a CRT. If that doesn't daunt you, look into the Sharp XG-1000 (\$4,495) from Sharp Electronics Corp., Professional Products Division, of Mahwah, New Jersey, or the Magna-Byte Video Projector (model 2001, \$2,895) from Telex Communications of Minneapolis, Minnesota.

Video projectors offer the same high-quality colors as a CRT at a slightly higher cost—currently about \$8,000 and up (see "Data Projectors: From Barroom to Boardroom," April 24, 1990). However, they are heavy and need tinkering to keep the image well-converged and sharp. More importantly, their displays are not very bright, so you must keep the room lights dim. You can improve the brightness by using special screens or rear projection, but these often limit the visibility range of the image. Move just a bit to one side, and you won't be able to see the picture.



EDITORS' CHOICE

- Barco Multidata SCM 2846
- Mitsubishi XC-3715C

We were disappointed with the image quality of the presentation monitors reviewed for this story. These units are incapable of producing high-resolution images in fine detail. Because of their huge 25- to 35-inch picture tubes, these machines are stretching CRT technology to its current limits. That's why most of the machines you have read about here fall back to only VGA resolution, even though they are able to accept Super VGA signals. In practice, though, VGA-level business applications (and also NTSC video signals, which are put out by TVs, VCRs, and video discs) shown on these screens to a group of people about 6 feet away provide more than satisfactory results. Many businesses require such capabilities of their conference-room monitors; to fulfill such a need, the monitors reviewed here are still your best bet.

For the biggest CRT screen, look at the 35-inch-diagonal \$7,599 Mitsubishi XC-3715C. This monitor offered tolerable performance (which quickly elevated it in our esteem when we considered the unit's size) and some thoughtful design enhancements, like the infrared remote that allows you to adjust the image via on-screen prompts—no more fiddling with controls! The XC-3715C can also take both RGB (computer-generated) and NTSC signals and display them simultaneously—a great feature for boardroom presentations. If you need an even

larger view, you'll have to move to another technology, such as rear-projection displays. Of course, these have their own problems, such as brightness levels and a limited visibility range (move too far left or right and you lose sight of the image entirely).

If your needs are more modest or you prefer several smaller displays around your conference room instead of one large screen, the Barco Multidata SCM 2846 offers the top NTSC-compatible picture of the tested group. The sleek \$3,995 monitor had a 26-inch-diagonal viewing screen that outperformed any of the other video-capable displays we tested. The SCM 2846, at one of the lowest prices in this crowd, displayed solid picture quality and came wrapped in a case nearly impervious to electromagnetic interference—a must for those who want to stack multiple monitors to create picture walls.

By the way, the best picture was displayed by the 26-inch-diagonal \$11,300 Mitsubishi HC3505SK. We aren't awarding it an Editors' Choice, however: Even though it fit our requirements, the HC3505SK was not designed as a presentation monitor. It handled Super VGA signals with unparalleled clarity, but its screen is too small for the boardroom, and it is unable to accept NTSC signals. As a high-end CAD monitor, the HC3505 excels, but for boardroom presentations, it just doesn't fit the mold.

NEW 40 MHz DX & 25 MHz SX COPROCESSORS NOW AVAILABLE

THERE IS
ONLY ONE LOTUS.
AND ONLY
ONE COPROCESSOR
RUNS IT FASTEST.

CYRIX.

For most people, the best reason to buy a math coprocessor is to make your software run faster. And the coprocessors that run it fastest are from Cyrix.[™] Because our FasMath[™] coprocessors outperform all others in running Lotus[®] 1-2-3[®] and other leading software by every available measure.

FasMath processors perform floating point operations from five to ten times faster than other coprocessors, thanks to an entirely new, innovative architecture. Which means that everyone's favorite spreadsheet will run up to three times faster with a Cyrix coprocessor.

You'll also find FasMath products are more accurate. Because they compute results to 20 decimal digits of accuracy, instead of the usual seven.

What's more, the FasMath family consumes less power. Which preserves battery life for laptop users. And, across all clock speeds, from our 16, 20, 25 and 33 MHz parts to our newly-announced 40 MHz processors, Cyrix coprocessors are

unmatched in compatibility. They're even backed by a five year limited warranty and a toll-free support hotline.

So call us at 1-800-FASMATH (that's 1-800-327-6284) and we'll send you the unvarnished truth straight from the experts who measure PC performance, including the experts at Lotus Development who test products and certify compatibility. Which should make choosing the math coprocessor that's right for you as simple as 1-2-3.



Cyrix[™]

Cyrix and FasMath are trademarks of Cyrix Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation.
©1991 Cyrix Corporation.

CIRCLE 747 ON READER SERVICE CARD

Finally, as with most PC product categories, there are the oddball technologies: weird gizmos that may fit your needs. In the presentation-screen arena, for example, there's the Information Station (with a price range from \$10,000 to \$15,000) from Applied Resources of Overland Park, Kansas. The Information Station is basically a 34- by 24-inch PC-controlled "paperless printer." The unit prints graphics or text files onto a continuous glass-protected mylar belt. After it is displayed,

the image is erased as the belt rotates, wiping one image off as the next one appears. This huge unit (nearly 7 feet tall) would be an ideal CRT alternative if it weren't for its equally mammoth price and black-on-white-only limitation (see First Looks, October 16, 1990).

CRT screens—like the ones reviewed here—tend to be brighter than the alternatives, with better-quality images. One

slightly lower-cost alternative worth consideration, however, is using a display card that produces NTSC video signals from VGA images (see "From VGA to NTSC: Putting Your PC on Tape," July 1990) and then running these through a standard video monitor like those sold for home entertainment. You can find 30-inch models for less than \$1,000 and 35-inch units for less than \$3,000. Add that to the cost of the board (anywhere from \$850 to \$1,700) and you can substantially

WHY A MONITOR ISN'T A TV

Ever wonder why you can't catch CNN on your PC monitor? You could with the presentation monitors in this roundup, if you know what to look for.

by John R. Quain

In broad terms, the kind of image you see on your computer display and the one you see on TV are the same. Both use similar CRT technology. However, the video signals are very different. You can't watch CNN on your NEC Multi-Sync without a special converter. In the case of presentation monitors, which are designed to project images to a group of people, it is more likely that you would want to have the option of displaying either computer graphics or live video images for presentations, seminars, and the like.

In fact, all but one of the large-screen sets in this review can handle computer and live or composite video—more precisely referred to as NTSC video (which is what you watch at home on your television and VCR). To accomplish this, these massive monitors need not only additional inputs and a connected video source (such as a VCR or camcorder) but also need to comply with the relatively ancient NTSC standard.

The National Television Standards Committee (NTSC) was formed in 1941 to set broadcast-TV standards in North America. (The European video broadcast standards, PAL (Phase Alternate Line) and SECAM (Sequential Color And Memory), are similar but incompatible because they were adopted at a later time and therefore benefited from more-advanced technology.) The NTSC

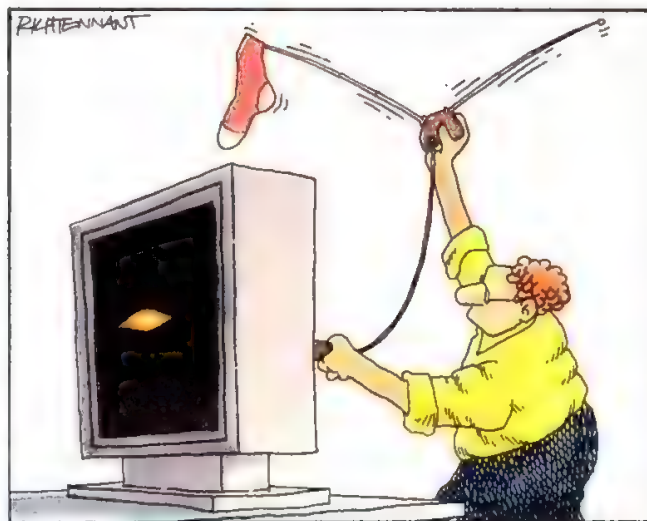
decided on a picture composed of 525 horizontal lines. The interlaced image is formed by two separate fields of 262.5 lines, which means that each image needs to be scanned twice by the CRT's electron guns to create a complete picture or frame. A broadcast NTSC signal carries additional information, including sync pulses and later FCC additions such as multichannel television sound (MTS) and second audio program (SAP). The monitors in this review don't have channel tuners or MTS decoders, but many of them can accept stereo audio via a pair of RCA jacks to which you can connect a VCR with a tuner and MTS decoder.

By comparison, most current computer graphics standards create a noninterlaced image by scanning the whole picture at once—one reason why this type of image is more stable than a TV picture. The other reason is the scanning or refresh rate. In TV vernacular, images are created 30 times a second (at a rate of 30 Hz). This is called the vertical refresh rate in computer display jargon, and many video adapter and computer monitor systems now have refresh rates around 70 Hz—more than twice that of the NTSC standard. The combination of these and other factors

spells the difference between the flickering subtitles you see on television and the sharper, more solid text you work with on a computer monitor.

These differences also mean that there are different bandwidth requirements for computer monitors and televisions. A good TV, for example, can manage a video bandwidth up to 7 MHz. A good computer display can respond to signals up to 30 MHz. In crude terms, the difference is a reflection of how fast the image must be created.

For many applications, you may want to take advantage of the NTSC capabilities of a large-screen monitor to display live video in addition to computer graphics. To perform such tasks, the monitor must not only be able to convert the NTSC signal into a picture, it must have special inputs in addition to the computer video connections—either an RCA jack for video, an S-video input, a single BNC-type connector, or an RF coaxial input. The majority of the monitors in this roundup will accept NTSC video through a BNC connector, and a few offer superimposed features to display



undercut the cost of one of these big CRTs.

On the other hand, NTSC video offers lower resolution than VGA's 640 by 480, so this would not be suitable for applications where you need to project fine detail. Also, this arrangement may mean that you'll find it less convenient to switch between different image sources, such as computer and videotape, in the middle of a presentation.

As you can see, though alternatives

both NTSC and computer signals simultaneously.

If you plan to use NTSC video, the monitor must be compatible with your VCR. Professional video equipment tends to favor BNC connections, making hookup to these big screen behemoths a simple matter. However, most home VCRs have RCA video outputs, but these are easily connected to the single BNC monitor connection by means of a 45-cent adapter. An NTSC compatible monitor will thereby allow you to use an 8-mm., Beta, or VHS VCR or camcorder.

A more recent and increasingly popular high-quality video format is Super VHS (SVHS). Based on the VHS format introduced to the home market by JVC in 1976, SVHS attempts to improve the resolution of recorded video by boosting the brightness (or luminance) portion of the composite video signal to a wider bandwidth. (Unfortunately, it does nothing to improve the color (chrominance) portion of the signal.) If you want to take full advantage of such equipment, which does offer some improvement in resolution over VHS, you will need an S-video input on the back of your monitor. This also gives you the flexibility of using video equipment based on the ED Beta and Hi8 formats, which use a similar approach to increase picture sharpness. S-connectors are the current home-video craze, so you'll also find them on high-end laser disc players, which can further augment your presentations.

You may not care if you can watch your favorite sitcom on your desktop NEC monitor, but an NTSC-compatible large-screen display can go a long way toward livening up your boardroom presentations. ■

exist, none quite measure up to a straight 35-inch CRT. If you need a large color VGA screen and the price is not a barrier, you will find your choices here.

DECISIONS, DECISIONS

One important consideration is the benchmark test results. We tested a single unit of each model, and there can be significant variations between similar-model units. Still, the results can give you a good indication of the picture quality you can expect. Some results, such as pincushioning and convergence, are acid tests of the manufacturer's design and quality control. We chose to measure image attributes in the lower-right corner of the screen, where faults are most obvious and frequent. Our benchmark test captions explain what the scores mean.

There are also a variety of specifications to consider, such as the increasing variations among VGA and Super VGA cards. The horizontal scanning frequency for VGA remains 31.5 kHz, but you now encounter various vertical scanning frequencies as manufacturers attempt to reduce screen flicker. A number of cards offer a 70-Hz vertical scan option, and you will want to make certain that your new monitor can handle this option if it is using such a card. A few of the monitors in this group can also handle higher horizontal frequencies, which is an important consideration if you need to send a higher-frequency signal to the screen. Keep in mind, however, that most of these big-monitor vendors claim a maximum resolution of only 640 by 480, even though they can accept a higher-resolution signal, so don't expect a sharp picture for high-resolution images.

SIGNALS AND CONNECTIONS

You might also need to connect your monitor to other types of computers, such as a Macintosh. These computers' displays have different characteristics from the PC versions, even though the resolutions are similar. For example, the PC VGA 640-by-480 resolution has horizontal and vertical scanning frequencies of 31.5 kHz and 60 Hz, respectively. The corresponding values for the Macintosh are 35 kHz and 66.7 Hz for the same 640-by-480 resolution. The Mac IIci 8-bit color card requires frequencies as high as 69 kHz horizontal and 75 Hz vertical. The key here is to know what frequencies your

video adapter cards are producing before you shop for a large monitor.

Most of the monitors here can handle some sort of video signal. Generally, they can accept NTSC composite video, and many can also handle S-video. A few can even accept the European video signals, PAL and SECAM. (See the sidebar "Why a Monitor Isn't a TV.") To show the output from a VCR, video camera, or laser disk, you'll want this feature.

Also consider the kind of connectors offered. It can be difficult to locate a 15-pin D-sub mini to five BNC coaxial cable on short notice, so check the features table and make sure you have the appropriate cable or can procure it from the manufacturer. On a related note, if you intend to set up multiple monitors to display the same image, make sure your monitor has the ability to pass the video signal through. This feature can make complex cable-routing far easier.

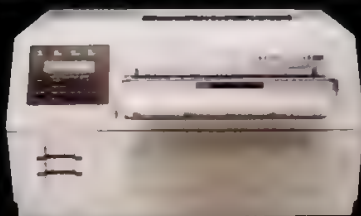
CONTROLS AND FUN FEATURES

What kind of controls does the monitor have, and where are they located? Are they in the front, where you can get at them easily, or in the back, where you can't adjust them and still see the screen at the same time? In testing, we discovered that a few monitors require two people to make screen adjustments—one to tweak the knobs and the other to provide feedback on the results. The remote controls offered by some of the monitors may seem a luxury at first, but if you have the monitor built into a wall or suspended from a ceiling, pressing buttons on an infrared remote is practically a necessity.

Other options and accessories can make these monitors more useful. Some offer a variety of stands and rolling carts for easy mobility and a sturdy surface. And if you want to get your large monitor out of the way on a more permanent basis, some even offer hooks so you can suspend them from ceiling mounts.

Then there is audio. If you only plan to pipe computer signals through your monitor, this isn't much of a consideration. If you plan to get involved in the various forms that multimedia presentations are taking nowadays, you may want to stay away from the no-speaker models. Some of the models with speakers are barely better than none at all, though; the tiny speakers produce thin and tinny sound, but at least these units also tend to have external speaker connectors so you can add better speakers. Only a select few

Our 8ppm printer
earned the Okidata OK!TM
by offering you something
the LaserJet[®] III doesn't.



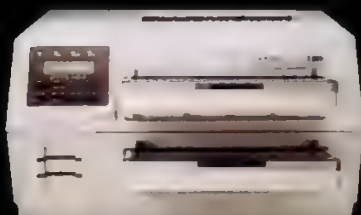
The OL800: 8ppm page printer \$1499



The OL820: W/built-in font scaling \$1999



The OL840: W/PostScript \$2999



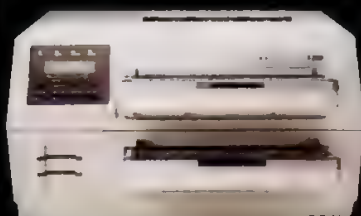
The OL800: W/200 sheet 2nd paper tray



The OL820: W/200 sheet 2nd paper tray



The OL840: W/200 sheet 2nd paper tray



The OL800: W/multi-user port (3 add'l users)*



The OL820: W/multi-user port (3 add'l users)*



The OL840: AppleTalk Network Ready

Freedom of choice.

Your best choice in an 8 ppm page printer is the one that gives you the most to choose from: the Okidata OL800 Series.

With Okidata, you're free to choose the features you need, free to save money by eliminating features you *don't* need, and even free to change your mind later.

The OL800: No Frills, But All The Options.

For only \$1499** list, the Okidata OL800 gives you a full-featured 8 ppm printer: 26 fonts, 4 typefaces, HP Series® II compatibility, both serial and parallel interfaces, and the industry's only 5-year warranty—on Okidata's unique LED printhead.

As your needs grow, you can easily add options that are *no* option with the LaserJet® III—a second paper tray for more flexible paper handling, or a network port that automatically accepts output from three additional PCs in a workgroup. You can even upgrade your OL800 to match either of our high-performance printers described below.

The OL820: Faster Than A LaserJet III.

Besides having more resident scalable fonts than the LaserJet III (13 versus 8), the OL820 also has more brains. Thanks to a unique hardware chip designed by Okidata engineers, it instantly solves complex font scaling, type rotation and grayscaling problems "on the fly"—problems the LaserJet has to go back to its software to work out.

So the Okidata OL820 can deliver up to three pages of sophisticated text while

the LaserJet III is still thinking about printing its first page. In fact, InfoWorld magazine found the Okidata OL820 to be "the fastest office printer we've tested."

Second paper tray and 4-station workgroup options are available for your Okidata OL820 as well.

The OL840: PostScript From PC To Mac And Back.

If Adobe PostScript® printing is on your menu, the Okidata OL840 offers it for \$700 less than a comparably equipped HP. Yet that low list price includes 35 genuine Adobe PostScript fonts, plus 26 bitmapped fonts (4 typefaces); 2 megabytes of installed RAM; plus serial, parallel, and AppleTalk Network® interfaces. You can connect the OL840 to both PC and Macintosh® workstations, and switch between systems instantly.

And the OL840 still leaves you with plenty of options—a second paper tray, extra memory, and a wide selection of additional PostScript fonts on easy-to-install ROM cards.

Finally, every Okidata OL800 Series printer has earned the Okidata OK!—your personal promise from us that it will deliver not just good value, but exceptional value...will provide not just adequate performance, but outstanding performance.

If you're looking for an 8 ppm page printer, your best choice is the one that gives you freedom of choice—the Okidata OL800 Series. For additional information please call 1 (800) OKI-DATA.



We don't just design it to work. We design it to work wonders.™

*Automatic selection of PC font. **Manufacturer's suggested retail price. Dealer price may vary. HP Series, LaserJet, Adobe PostScript, AppleTalk Network, Macintosh are trademarks of their respective corporations. Okidata is a registered trademark of Okidata America Inc. Marque déposée de Okidata America Inc. OKI OK! is a trademark of Okidata America Inc. LTD. "We don't just design it to work. We design it to work wonders." is a trademark of Okidata America Inc. InfoWorld 10/1/90.

HARDWARE

PRESENTATION MONITORS

came with internal speakers sufficient for most presentation environments. Make sure to check the features table to find units that offer them.

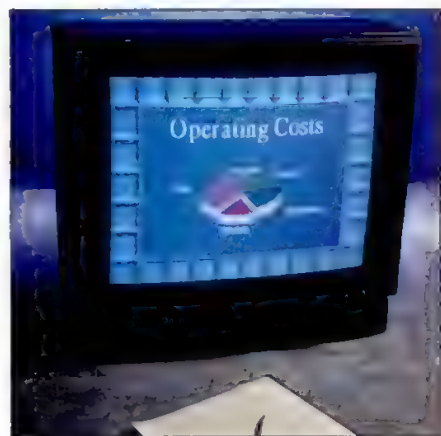
Finally, consider the size of the unit you are contemplating. These units are big! A yard wide in some cases, more than 2 feet deep, and weighing from 100 to 200 pounds or more, these monitors have attributes that require some serious forethought. The screens make their presence known in a big way, so make sure you have room for one before you invite it to move in on a permanent basis.

Then again, making their presence known is just what these mighty monitors are all about. If you're tired of having people elbowing for position around a 14-inch—or even a 20-inch monitor, or if you just want to make a lasting impression, read the reviews that follow and don't be afraid to think big!

BARCO INC.

Barco Multidata OCM 2846

by John R. Quain



The 26-inch \$3,795 Multidata OCM 2846 from Barco Inc. suffers from performance problems.

If you judge the \$3,795 Barco Multidata OCM 2846 merely by its specifications and features, it would seem to be on par with its two distinguished siblings, the Multidata OCM 3346 and the Multidata SCM 2846. Nevertheless, in terms of picture performance, you will find that the OCM 2846 comes up short.

The 26-inch-diagonal monitor has the same 0.8-mm. dot pitch and 800-by-600 maximum resolution as its brethren. It sports the same connections on its back panel and also boasts a similar array of

features: NTSC, PAL, and SECAM compatibility; the ability to sync on green, composite, or separate signals; and the capacity to manage computer video adapters up to and including interlaced signals of 1,024-by-768 pixels. Unfortunately, the actual picture performance of this middle child makes it the underachiever of the Barco bunch.

On the VGA tests, vertical lines were conspicuously wider than horizontal lines. Normally, we would expect such a result, given the striped dot pitch of these monitors, but the good horizontal line width made the poorer vertical results all the more obvious. The OCM 2846 also produced the second-worst drift ratio numbers of the three Barco monitors, resulting in a less stable picture.

Compounding these shortcomings, reduced picture brightness proved to be a detriment to the OCM 2846. When tested by the Microvision Superspot, the OCM 2846 was unable to achieve the same brightness levels as the other monitors in this roundup (15 footcandles or better); its maximum was 12 footcandles. This shortcoming proved noticeable when the OCM 2846 received an NTSC video source, especially when compared with that of the other presentation monitors. Under fluorescent lights, its display looked particularly dull alongside other monitors, such as the Mitsubishi models.

Like the OCM 3346, this monitor comes in a traditional television-style case; an additional clear dust cover stretched across the front creates a flat-screen effect. Although the rear jack panel was slightly misaligned on all three Barco models, this presented more of a problem with the OCM 2846. The VGA connector



FACT FILE

Barco Multidata OCM 2846

Barco Inc., 1000 Cobb Place Blvd., Kennesaw, GA 30144; 404-590-7900.
List Price: \$3,795 (no cables supplied).
Requires: Apple II GS, Mac II, Hercules, MDA, CGA, EGA, MCGA, VGA, Super VGA, or 1,024-by-768 (interlaced) graphics adapter.
Measured Diagonal Screen Size: 26 inches.
In Short: Though the Multidata OCM 2846 made a good showing when compared with the rest of the pack, its picture and construction failed to match that of the other Barco representatives.

CIRCLE 910 ON READER SERVICE CARD



PRESENTATION MONITORS: SUMMARY OF FEATURES

Products listed in ascending price order

PHYSICAL SPECIFICATIONS

Measured diagonal screen size (inches)
Monitor case dimensions (HWD, in inches)
Weight (pounds)
Length of power cable (inches)
Adapter cable supplied
FCC certification class

SIGNAL COMPATIBILITY

1,280 x 1,024
1,024 x 768 (noninterlaced)
1,024 x 768 (interlaced)
Super VGA (800 x 600)
VGA (640 x 480)
MCGA
EGA
CGA
MDA
Hercules
Mac II
Apple II GS

OPERATIONAL FEATURES

Maximum resolution (pixels)
Video bandwidth (MHz)
Vertical scanning frequency range (Hz)
Horizontal scanning frequency range (kHz)
Phosphor persistence
Dot pitch (millimeters)
Modes that maintain image size

Number of user-adjustable image settings

Input connectors:

Analog D-sub

Analog BNC coaxial:

Sync on green
Composite sync
Separate sync

Digital/TTL

Composite video
NTSC
BNC
RCA jack
S-video

Output connectors:

Analog D-sub connector

Analog BNC coaxial:

Sync on green
Composite sync
Separate sync

Digital/TTL

Composite video
NTSC
BNC
RCA jack
S-video



—Editors' Choice

■—Yes

□—No

HARDWARE
PRESENTATION MONITORS

Barco Multidata OCM 2846	Barco Multidata SCM 2846	Barco Multidata OCM 3346	Mitsubishi AM-3151A	Mitsubishi XC-3310C	NEC DM-3000P	Mitsubishi AM-3501R	Mitsubishi XC-3715C	Mitsubishi HC3505SK
\$3,795	\$3,995	\$4,795	\$5,200	\$5,495	\$5,600 *	\$6,900	\$7,599	\$11,300
26 23 x 25 x 19 95 72 □ B	26 18 x 23 x 17 93 72 □ B	31 26 x 30 x 21 148 72 □ B	31 26 x 30 x 21 143 72 ■ A	33 26 x 28 x 22 172 72 □ A	30 28 x 31 x 21 137 72 ■ A	35 34 x 38 x 27 266 72 ■ A	37 29 x 34 x 23 216 72 □ A	26 22 x 26 x 26 122 72 □ A
□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ □	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	□ □ ■ ■ ■ ■ ■ ■ ■ ■ □ □	□ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ □
800 x 600 30 45-120 15-36 Medium 0.80 None 1	800 x 600 30 45-120 15-36 Medium 0.80 None 1	800 x 600 30 45-120 15-36 Medium 0.80 None 1	640 x 480 15 45-90 15.6-36 Medium-short 0.83 MDA, CGA, EGA, VGA 1	800 x 600 30 40-75 15.75-35 Medium-short 0.88-0.99 CGA, EGA, VGA, Mac II 4	640 x 480 20 50-87 15-35.5 Medium 0.80 VGA, 8514/A 1	640 x 480 15 45-70 15-35.5 Short 1.0 None 8	800 x 600 35 45-120 15.7-36 Medium-short 0.85-1.1 CGA, EGA, VGA, Mac II 6	800 x 600 50 45-90 15.7-38 Medium-short 0.31 VGA, Super VGA, Mac II 6
9-pin mini, 15-pin mini ■ ■ ■ ■ ■ ■ ■ ■ □ ■	9-pin mini, 15-pin mini ■ ■ ■ ■ ■ ■ ■ ■ □ ■	9-pin, 15-pin ■ ■ ■ ■ ■ ■ ■ ■ □ ■	25-pin ■ ■ ■ ■ ■ ■ ■ ■ □ ■	15-pin mini ■ ■ ■ ■ ■ ■ ■ ■ □ ■	15-pin mini □ ■ ■ ■ ■ ■ ■ ■ □ ■	25-pin ■ ■ ■ ■ ■ ■ ■ ■ □ ■	15-pin standard ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	15-pin mini ■ ■ ■ ■ ■ ■ ■ ■ □ □ □ □ □ □
15-pin standard ■ ■ ■ □ ■ ■ ■ ■ □ ■	15-pin standard ■ ■ ■ □ ■ ■ ■ ■ □ ■	15-pin standard ■ ■ ■ □ ■ ■ ■ ■ □ ■	None ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	None □ □ □ □ □ □ □ □ □ □	15-pin mini □ □ ■ ■ ■ ■ ■ ■ □ ■	None ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	None □ □ □ □ □ □ □ □ □ □	None □ □ □ □ □ □ □ □ □ □

* With IPS-100 VGA Interface.

CONTINUES

HARDWARE

PRESENTATION MONITORS

had an especially tight fit, and the D connector was mounted too close to the housing for some cable ends—an indication of inferior assembly.

None of these shortcomings on its own would seriously detract from the OCM 2846's performance, but in concert they prevent an otherwise excellent monitor from matching the performance of its relatives. If you are looking for the best—a larger screen or a sharper picture—you'll be better served by shelling out the extra money for one of the other two Barcos.

BARCO INC.

Barco Multidata OCM 3346

by John R. Quain



The \$4,795 Barco Multidata OCM 3346 provides a 31-inch screen and internal speakers.

Founded in 1934, Barco has one of the most venerable names in video. The Belgium-made Barco monitors we tested can compete with the finest displays available. Indeed, in this gathering of presentation monitors, the Barcos delivered the finest overall picture quality as a group, with the Multidata OCM 3346 coming in second among the three Barcos.

With a visible diagonal screen size of 31 inches and a 0.8-mm dot pitch, the \$4,795 OCM 3346 is the largest and most expensive of the three Barcos. The 800-by-600-pixel unit can accommodate resolutions up to interlaced 1,024-by-768. Moreover, it can automatically adapt to NTSC, PAL, and SECAM composite video sources (although some vertical adjustment is required if you want to switch between these broadcast standards).

All Barco monitors offer a similar array of inputs and outputs. There are

BNC-5 connectors for analog RGB input and output, as well as three additional RGB inputs for a 9-pin mini, 15-pin mini, and 25-pin D-sub connector. For composite video, there are two single BNC connections for input and output, plus two RCA jacks to feed audio (mono only) in and out of the set. If you have professional S-video-equipped gear, the OCM 3346 can accommodate one 7-pin S-video source in addition to the more-common 4-pin S-video arrangement.

These European models also offer two unusual connections. The first is a SCART connector primarily used in Europe for teletext transmissions. The second and more important one is the slave-out D-15 connector, which is especially useful if you plan to daisy chain several monitors together or want to use a standard computer monitor in conjunction with OCM 3346. The slave-out connector, unlike a standard loop-through output, delivers an analog RGB signal no matter what the original source. You can use the Barco monitors to convert a composite video signal, for example, into RGB analog and then feed it out to another monitor.

When used only for VGA display, the OCM 3346 was one of the better performers in terms of delivering a readable text-filled screen. This is an indication of good transient response (the set's ability to make sudden transitions, such as from black to white, without leaving traces of gray in between). On the OCM 3346, the tightly packed letters were sharp and fully saturated, though clarity faded toward the edges. The sharpness of the *Microsoft Windows 3.0* menu headings, for example, decreased noticeably from the innermost HELP option to the outermost FILE prompt.

Minor criticisms include a few brightness deficiencies. In a typical room illuminated by fluorescent lights, the picture of the OCM 3346 looked lackluster, and the monitor's brightness control did little to improve results. In VGA mode, detailed graphics, some roping or waviness of the vertical edges of fine-lined graphics showed near the edge of the screen (also seen on other monitors) along with some slight pincushioning.

What we found particularly irksome were the unwieldy controls and inscrutable owner manual. The primary analog controls (brightness, contrast, hue, power, tint, and volume) are beneath a plastic



PRESENTATION MONITORS: SUMMARY OF FEATURES

Products listed in ascending price order

USER CONTROLS

Tint/hue
Brightness
Contrast
Horizontal position
Vertical position
Horizontal size
Vertical size
Overscan
Underscan
Vertical hold
Pincushioning
Convergence
Text switch
8/16/64-color switch
Degaussing button
120/240-volt switch

PC —Editors' Choice ☒ —Yes ☐ —No



FACT FILE

Barco Multidata OCM 3346

Barco Inc., 1000 Cobb Place Blvd., Kennesaw, GA 30144; 404-590-7900.
List Price: \$4,795 (no cables supplied).
Requires: Apple II GS, Mac II, Hercules, MDA, CGA, EGA, MCGA, VGA, Super VGA, or 1,024-by-768 (interlaced) graphics adapter.
Measured Diagonal Screen Size: 31 inches.
In Short: Matched against the other 31-inch monitors here, the Multidata OCM 3346 produced one of the sharpest images. If you want a large picture but can't afford a 35-inch model, this may be the monitor for you.

CIRCLE 611 ON READER SERVICE CARD

panel on the monitor's front, as are input selection buttons for analog RGB, TTL, VGA, and video. However, to reach the other controls, such as those for sizing and positioning, you have to go to the back panel. Adjustments for monochrome 8/16/64-color TTL, for example, require that you set a number of DIP switches sunk into the chassis. The supplied documentation—a maze of crammed flow charts—does little to make adjustments easier.

If you plan to use a multistandard monitor such as this one for multimedia presentations, you should also note this

PC Magazine said it best...
"Northgate stops at nothing to please its customers!"*

Call Northgate® Now.

**Northgate
Exclusive!**
Edsun CEG Chip
available with
SlimLine
386/33!



Award-winning performance, unequalled service and incredible support for a price IBM®, Compaq® and Dell® can't hope to match.

The power of 386™ computing is the lifeblood of business today. And more and more, Northgate is the vendor of choice. Why? Northgate is the only company who consistently earns top ratings for performance, service, support and bottom-line value. Industry experts and users worldwide agree.

Northgate 386 ... computing's most decorated line. Northgate's rise to the pinnacle of 386 technology started in 1988 when *Computer Shopper* readers voted Northgate's 386 Power System both a "Best Buy" and Overall Best Buy. A few months later, *PC Magazine* named Northgate 386/20 and 386/25 "Editors' Choice." Later that year, our 386/33 received the same honor. Along the way, our 386 systems won several *InfoWorld* recognitions as well.

Revolutionary systems of the 90's: Northgate SlimLine.™

Often copied, never duplicated! It seems like everyone has jumped on the SlimLine bandwagon these days. Truth is, Northgate pioneered this incredible technology. We were the first to introduce full power 386 systems in a case measuring only 4.25" high.

Architecture that stunned the industry! SlimLine's fully-integrated motherboard features built-in IDE hard drive and floppy drive controllers, one parallel and two serial ports plus a 16-bit VGA controller. And we didn't scrimp on expansion capabilities. Our unique expansion tree has three full-length 16-bit and two half-length 8-bit slots for all your add-ons and peripherals.

Perfect single-user workstation or network terminal. SlimLine is ideal for use where you need full-size 386 power, but space is a premium.

For comprehensive system features and popular configurations, see next page.

Northgate Elegance™: Full-size 386 power and expandability.

The business systems of choice. Elegance's award-winning reputation has made them the choice of Fortune 1000 corporations, government agencies and universities around the world. And with good reason.

Elegance full-size systems are designed to allow you to easily expand your system as your business needs increase. You only pay for the components you need now.

Power for every application. From "simple" tasks like word processing and desktop publishing to advanced CAD/CAE and database management applications, Elegance delivers. To find out what systems are right for you, see next page for system configurations and upgrade options.

Northgate wins 1990 Micro-computer Marketing Council's Service and Support Award!

- 30-day no-risk trial period
- Full one year warranty on systems, 5 years on OmniKey keyboards.
- Northgate responds to your needs with overnight shipment of parts—at our expense!
- Free on-site service to most locations for one year if we can't solve your needs over the phone.
- Unique 24-hour toll-free technical support—the industry's best!
- We accept VISA, MasterCard, Discover and Northgate's Big 'N' card. We offer leasing and financing options, too!

Free pre-purchase consultation. Nobody spends thousands of dollars on systems during the first phone call. You know it, we know it. Instead, we offer a no-obligation pre-purchase consultation with one of our highly-trained Technical Consultants. You won't get high-pressure tactics or commission-hungry salespeople. Just friendly assistance in matching your business needs with the appropriate Northgate solution.

CALL
TOLL-FREE **800-828-6125**
IN USA AND CANADA

Fortune 1000 corporations, government agencies and education institutions, call National Business Accounts: **800-548-3510**
Notice to the hearing impaired: Northgate has TDD capability. Dial 800-535-0602.

 **NORTHGATE
COMPUTER
SYSTEMS, INC.**
"Smart Tools For Business"™

7075 Flying Cloud Drive,
Eden Prairie, Minnesota 55344

Only Northgate® offers a full range of 386 systems in SlimLine™, Desktop and Vertical Power Cases!



SlimLine... a Northgate original!

SlimLine Features:

- Small footprint (16.5" square x 4.25" high) SlimLine case with room for two exposed and one internal half-height devices
- 64K SRAM read/write-back cache
- 1.2Mb and 1.44Mb floppy disk drives
- Integrated 16-bit SVGA with 1024 x 768 resolution; 512K memory
- Intel® and Weitek math co-processor support
- 150 watt power supply
- Clock/calendar chip rated at 5 years
- OmniKey® keyboard
- MS-DOS 4.01 and GW-BASIC installed
- On-line user's guide to MS-DOS 4.01
- QA Plus Diagnostic and utility software
- FCC Class B certified

SlimLine 386SX/16 and 20 MHz with 64K Cache

- Intel 80386SX/16 or 20 Mhz processor
- 40Mb hard drive
- 2Mb of RAM on motherboard
- 14" SVGA color monitor

\$2399⁰⁰/\$2599⁰⁰ Or as low as **\$75⁰⁰/\$80⁰⁰** per month*

SlimLine 386/25 MHz with 64K Cache

- Intel 80386/25 Mhz processor
- 100Mb hard drive
- 4Mb of RAM on motherboard
- 14" SVGA color monitor

\$3399⁰⁰ Or as low as **\$105⁰⁰** per month*

SlimLine 386/33 MHz with 64K Cache

Exclusive! The Edsun CEG chip is now available with SlimLine 386/33. This device emulates up to 2048 x 2048 resolution and lets your standard VGA monitor display an incredible 750,000 colors. Plus, it smooths out the jagged edges around images, giving you clarity and brilliance you must see to believe! Other features:

- Intel 80386/33 Mhz processor
- 200Mb hard drive
- 4Mb of RAM on motherboard
- 14" SVGA color monitor

\$3899⁰⁰ Or as low as **\$120⁰⁰** per month*

"Editors' Choice" — all Elegance™ systems

Elegance Features:

- 5-bay desktop case with room for 3 exposed and 2 internal half-height devices; 200W power supply
- Optional 7-bay vertical power case has 220W power supply
- RAM expansion up to 8Mb on motherboard (16Mb total RAM with 32-bit memory card)
- One parallel and two serial ports
- Intel and Weitek co-processor support
- MS-DOS 4.01 and GW-BASIC installed
- On-line user's guide to MS-DOS 4.01
- QA Plus Diagnostic and Utilities software
- SMARTDrive™ disk-caching software
- FCC Class B and Novell certified

Northgate Elegance 386/25

- Intel 80386/25 Mhz processor
- 4Mb of RAM
- 100Mb hard drive
- 64K SRAM read/write-back cache
- 1.44Mb and 1.2Mb floppy drives
- 16-bit SVGA Adaptor
- 14" SVGA color monitor
- OmniKey keyboard
- Microsoft® Windows™ and mouse

\$3699⁰⁰ Or as low as **\$115⁰⁰** per month*

Northgate Elegance 386/33

- Intel 80386/33 Mhz processor
- 4Mb of RAM
- 200Mb hard drive
- 64K SRAM read/write-back cache
- 1.44Mb and 1.2Mb floppy drives
- 16-bit SVGA Adaptor
- 14" SVGA color monitor
- OmniKey keyboard
- Microsoft Windows and mouse

\$4449⁰⁰ Or as low as **\$140⁰⁰** per month*

If one of these popular SlimLine or Elegance models doesn't meet your needs, CALL! We'll custom build one just for you!

CALL TOLL-FREE
800-828-6125

IN U.S.A. AND CANADA

Major corporations, volume purchasers and government agencies call National Business Accounts: **800-548-3510**

Notice to the hearing impaired: Northgate has TDD capability. Dial 800-535-0602

NORTHGATE
COMPUTER
SYSTEMS, INC.
"Smart Tools For Business"™
7075 Flying Cloud Drive, Eden Prairie, MN 55344

©Copyright Northgate Computer Systems, Inc. 1991. All rights reserved. Northgate, OmniKey, Elegance and the Northgate logo are registered trademarks of Northgate Computer Systems, Inc. All other products and brand names are trademarks and registered trademarks of their respective companies. Prices and specifications subject to change without notice. Northgate reserves the right to substitute components of equal or greater quality or performance. All items subject to availability. We support the ethical use of software. To report software copyright violations, call the Software Publishers Association's Anti-Piracy Hotline at 1-800-388-9888. *Offer changed to meet Northgate's 12% and 10% A/P.

power cables, or other monitors) created picture distortion on most of the other

units tested at PC Magazine Labs, the SCM 2846 ignored such conditions.

On our VGA tests, the SCM 2846 produced the lowest drift-ratio numbers, testament to its solid clear picture. It also maintained remarkably consistent vertical line widths—the best in our group. Consequently, graphics displayed on the SCM 2846 were sharp and steady with clean whites that contained little color contamination. The only flaw we could find was a slight amount of barrel distortion, as evidenced by our horizontal pin-cushioning test. When displaying NTSC composite video signals, the SCM 2846 continued to excel; its display was slightly brighter than the two other Barco monitors and did not exhibit any color bleeding or fuzzy edges.

The SCM 2846 won't win any prizes for ergonomics from the average user: Like the other monitors from Barco, you cannot plug several composite video sources into it at once, there is no remote control, and the set suffers from the same awkward controls. The SCM 2846 also lacks audio features. (But then again, if you are going to spend nearly \$4,000 on a 26-inch monitor, you should be running sound through an independent amplifier.) However, for those looking for the best presentation-size picture available that can display computer and composite video, the picture performance of the SCM 2846 is unsurpassed.

**MITSUBISHI ELECTRONICS
AMERICA INC.**

**Mitsubishi
AM-3151A**

by John R. Quain

Looking more comfortable playing the part of a television than a computer display, the \$5,200 Mitsubishi AM-3151A



The 31-inch \$5,200 Mitsubishi AM-3151A shows disappointing image quality.

displayable resolution of 640-by-480 pixels, one doesn't expect wonders, but coarse images turned out to be the least of this monitor's problems.

From the beginning, the AM-3151A's 31-inch-diagonal screen exhibited an abnormally bright area in the center of the screen, pronounced moiré patterns, and softened images (this last problem was particularly obvious on the right side of the screen). Much of this distortion turned out to be environmental: Repositioning the set helped, as did adjustment of its north/south directional and beam-strength controls.

Even after improving on the initial results, however, color distortion that appeared as stains in the corners of the screen was still apparent. It turned out that this dismal VGA performance had other causes. Poor convergence was largely to blame, especially along the right verti-

cal edge of the screen. All in all, the AM-3151A did not produce very stable images.

On the other hand, standard NTSC video performance was just fine—better in fact than the larger Mitsubishi AM-3501R. If you're interested in NTSC applications, you will be pleased that this set boasted superior stereo audio performance. It uses two side-mounted speakers that can be detached from the monitor to improve the stereo effect. The speakers are connected by two pairs of standard speaker terminals on the back panel. Here you will also find two BNC composite video inputs and one BNC video output, each with their own stereo audio RCA jacks. This monitor also accommodates S-video input as well as standard BNC-5 inputs and outputs, analog, and TTL connections.

All of the AM-3151A's controls are hidden behind a panel below the monitor screen. The usual picture-quality, size, and positioning controls (all analog) are included, as well as an 8/16/64-color switch and a degaussing button (which did not do enough to alleviate the set's shortcomings).

For a company that has built such a considerable reputation in the television and home-computer monitor markets, the AM-3151A was a disappointment. VGA graphics simply put too much of a strain on this set's abilities. If you are looking for a good solid monitor for public demonstrations, you would do better to look at other products in this group. If you're looking for a television, Mitsubishi offers 31-inch sets that include TV tuners for around half the price.



Mitsubishi AM-3151A
Mitsubishi Electronics America Inc.,
Professional Electronics Div., 800 Cottontail
Ln., Somerset, NJ 08873; 201-563-9889
Full coverage on computer monitors

**MITSUBISHI ELECTRONICS
AMERICA INC.**

**Mitsubishi
AM-3501R**

by John R. Quain

Northgate 486™/25 & 33 MHz

486 ISA...486 EISA.

Only Northgate gives you a choice!



Number One! Elegance™ 486/25 & 33 MHz ISA



InfoWorld's Product of the Year! After outscoring the competition in InfoWorld's 1990 reviews, and being praised as "tops in support and value,"† Elegance

486/25i was awarded the publication's highest honor: Product of the Year. This was the fourth award given to an Elegance 486 system ... no other company comes close!

PC Magazine says "Editors' Choice!" When reviewing 486/25 systems, they said "Only one machine stands out ... you could pay less for a 486 system, but not get the bonuses that are offered with the Elegance."††

In the February 12, 1990 issue, PC Magazine declared Elegance 486/33 Editors' Choice, saying the system was "a sure winner in its class."



Elegance 486/25i, Sept. 11, 1990
Elegance 486/33i, Feb. 12, 1990



Computer Shopper readers agree! Elegance 486/25i breezed past the competition and captured a 1990 "Best Buy" award. This makes three years in a row, a Northgate Elegance system was voted

tops by Computer Shopper readers.

ISA 486 System Features:

- ♦ Intel 486/25 or 33 MHz processor
- ♦ 4Mb RAM; expandable to 8Mb on motherboard
- ♦ 200Mb IDE hard drive
- ♦ 1.2Mb and 1.44Mb floppy drives
- ♦ 64K SRAM read/write-back cache
- ♦ ISA bus
- ♦ One 32-bit, six 16-bit and one 8-bit slots
- ♦ One parallel and two serial ports
- ♦ Vertical "Power" case (desktop available)
- ♦ 16-bit VGA graphics adaptor with 512K video RAM (expandable to 1Mb)
- ♦ 14" SVGA color monitor
- ♦ OmniKey®/ULTRA keyboard
- ♦ MS-DOS 4.01 or 3.3 and GW-BASIC software installed
- ♦ Microsoft® Windows™ 3.0 and mouse
- ♦ FCC Class B Certified

\$5399⁰⁰ / \$6299⁰⁰
25 MHz / 33 MHz



486 EISA gives you full 32-bit performance!

Performance that rivals RISC-based minicomputers costing thousands more! New 32-bit EISA bus gives you the power to transfer data along your network at burst mode speeds up to 33 megabytes per second. That's a 15-fold improvement over 16-bit AT buses serving medium-to-large networks.

Complete compatibility! Elegance 486e is 100% compatible with UNIX, Novell® and DOS. Plus, Elegance is compatible with existing 8-bit and 16-bit ISA adapters, so you benefit from downward compatibility.

Compare Elegance 486e performance and Northgate service and support with any other vendor's in the industry. You'll find you can't buy better than Northgate! Call now ... let Northgate build your system today!

True EISA 486 System Features:

- ♦ Intel 486/25 or 33 MHz processor
- ♦ 4Mb RAM; expandable to 32Mb on motherboard
- ♦ 1Mb EISA caching SCSI controller
- ♦ 200Mb SCSI hard disk
- ♦ 1.2Mb and 1.44Mb floppy drives
- ♦ 128K SRAM read/write-back cache
- ♦ EISA bus
- ♦ Eight 32-bit EISA slots; six bus master and two slave
- ♦ One parallel and two serial ports
- ♦ 16-bit VGA graphics adaptor with 512K video RAM (expandable to 1Mb)
- ♦ 14" SVGA monochrome monitor
- ♦ Vertical "Power" case
- ♦ 300 watt power supply
- ♦ OmniKey®/ULTRA keyboard
- ♦ MS-DOS 4.01 or 3.3 and GW-BASIC software installed
- ♦ Microsoft mouse
- ♦ FCC Class B Certified

8199⁰⁰ / \$9199⁰⁰
25 MHz / 33 MHz

Northgate wins 1990 Microcomputer Marketing Council's Service and Support Award!

- ♦ **30 Day No-Risk Trial.** To assure your complete satisfaction, Northgate gives you a 30-day No-Risk Trial.
- ♦ **Full parts and labor warranties:** 1 year on systems; 5 years on OmniKey keyboards.
- ♦ **Overnight shipment of replacement parts when needed** — at our expense.
- ♦ **Northgate's unique 24-hour toll-free technical support** leads the industry — most needs are met with just one call!
- ♦ **Free on-site service** to most locations if we can't meet your technical needs over the phone.
- ♦ **Easy financing:** Use your Northgate Big 'N', VISA, MasterCard or Discover Card. Leasing terms up to five years also available.

Free Pre-purchase Consultation

Nobody spends thousands of dollars on systems during the first phone call. You know it, we know it. Instead, we offer a no-obligation pre-purchase consultation with one of our highly-trained Technical Consultants. You'll receive friendly assistance in matching your business needs with the appropriate Northgate solution.

**CALL TOLL-FREE
800-828-6125**

IN U.S.A. AND CANADA

Fortune 1000 corporations, government agencies and education institutions call National Business Accounts: **800-548-3510**

Notice to the hearing impaired: Northgate has TDD capability. Dial 800-535-0602.



"Smart Tools For Business"™

7075 Flying Cloud Drive, Eden Prairie, Minnesota 55344



PERFORMANCE TESTS: PRESENTATION MONITORS

The Mitsubishi HC3505SK produced the best picture among these massive monitors. Every other monitor performed solidly except the NEC DM-3000P. Its vertical pincushioning was so severe that our testing equipment could not measure it.

The monitors for this review were tested with the Microvision Super-spot 100. This device calculates spatial relationships by using a tiny array of photodiodes to measure the light emitted from the screen. Using the VESA-compliant ATI VGAWonder Plus card, we drew 1-pixel-wide lines at the borders of the screen at VGA (640 by 480) resolution.

■ The **Vertical Line Width** test measures the width of a 1-pixel-wide vertical line 1 inch above the screen's bottom right-hand corner. Three separate lines (red, green, and blue) are measured, and the resulting average is given in mils (one mil = 0.001 inch).

■ The **Vertical-Line Convergence** test score represents the worst-case convergence of the three electron guns. We measured the distances between the centers of excited red, green, and blue dots within a vertical line at the screen's bottom right-hand corner, and we report the largest of the three distances. A smaller number indicates that the monitor displays less color "bleeding."

■ The **Vertical Pincushioning** test measures the curvature of a vertical line near the edge of the display. Pincushioning is given in terms of the maximum deviation from a straight vertical line. A smaller number indicates a straighter line.

■ The **Horizontal Line Width** test measures the width of a 1-pixel-wide horizontal line located 1 inch below the screen's top left-hand corner. Three separate lines (red, green, and blue) are measured, and the resulting average is given in mils.

■ The **Horizontal-Line Convergence** test score represents the worst-case convergence of the three electron guns. We measured the distances between the centers of excited red, green, and blue dots within a horizontal line at the screen's bottom right-hand corner, and we report the largest of the three distances. A smaller number indicates that the monitor displays less color "bleeding."

■ The **Horizontal Pincushioning** test measures the curvature of a horizontal line near the edge of the display. Pincushioning is given in terms of the maximum deviation from a straight horizontal line. A smaller number indicates a straighter line.

■ **Line Width Variance** is a computed figure that indicates the deviation from an optimal 1:1 ratio between horizontal and vertical line widths. For VGA, which has nominally square pixels, a lower value indicates better pixel sizing.

■ **Drift Ratio** is a computed figure that reports drift (the distance a line moves over a 1-minute period) as a percentage of average line width. A lower number indicates better image stability.

	Vertical Line Width (mils)	Vertical-Line Convergence (mils)	Vertical Pincushioning (mils)	Horizontal Line Width (mils)	Horizontal-Line Convergence (mils)	Horizontal Pincushioning (mils)	Line Width Variance (deviation from 1:1 ratio)	Drift Ratio (proportion of line width)
NEC DM-3000P	48.43	22.70	N/A	68.97	100.00	76.00	0.49	0.48
Mitsubishi XC-3715C	54.20	31.90	44.30	110.60	53.10	32.10	1.04	0.44
Mitsubishi XC-3310C	52.27	50.60	19.80	59.43	51.40	33.50	0.14	0.45
Barco Multidata SCM 2846	67.83	9.63	14.40	55.47	30.10	62.40	0.18	0.19
Barco Multidata OCM 3346	58.93	34.00	59.20	47.40	28.30	11.80	0.20	0.32
Mitsubishi AM-3151A	61.67	44.00	62.70	80.23	24.30	46.00	0.30	0.37
Mitsubishi AM-3501R	95.80	29.00	38.80	52.93	19.20	55.30	0.45	0.26
Barco Multidata OCM 2846	80.70	10.30	60.90	38.73	9.18	48.80	0.52	0.29
Mitsubishi HC3505SK	30.00	20.80	77.70	21.03	4.30	8.09	0.30	0.59

CONTINUES

to a projection set), but also one of the most feature-laden.

The AM-3501R is able to handle a variety of RGB video sources (everything from Mac II graphics to interlaced 1,024 by 768) in addition to NTSC composite video sources. But don't expect to actually see resolutions of 1,024 by 768. With a large dot pitch of 1.0 mm. (at the screen's center) and a maximum resolution of 640-by-480 pixels, you can expect to lose some detail. Some may dismiss this model as bloated, overweight, and lacking the finesse required for complex graphics. Nonetheless, considering its massive

screen area, the AM-3501R is able to deliver surprisingly bright and sharp VGA pictures, yielding a better overall image than many smaller monitors.

On our VGA tests, though line widths looked a little fat and the flicker rate was a little high, under actual viewing conditions the AM-3501R managed to maintain a consistent clear picture. Brightness levels were even across the screen, revealing no uneven hot spots. Furthermore, the pincushion and barrel distortion that plagues sets larger than 30 inches was completely absent. An NTSC video source produced high-quality images as well.

The only shortcoming was some slight color bleeding and a small amount of color distortion distinguishable in closely-spaced horizontal objects, such as car radiator grills.

Indeed, unlike the other Mitsubishi monitors here, this model and the AM-3151A are as much televisions as they are computer displays. Not only does this set include BNC connectors for RGB input and output, a 25-pin analog input, a 9-pin TTL input, and stereo audio inputs to fulfill its role as a computer monitor, it also boasts a full complement of NTSC composite video connections. These in-

Now, buy a computer or pick up a part and just say "Charge it!"



Northgate's Big 'N' Card frees up your other credit cards!

Greater purchasing power! Northgate's Big 'N' credit card gives you the purchasing power you need to put Northgate's industry-leading technology to work for you.

Greater convenience! When you carry the Big 'N' card, you have the convenience of purchasing a system, upgrades or peripherals right at your fingertips. And you don't need to worry about tying up your credit line on your other cards.

Instant credit! If you're a credit qualified customer, we can usually set up your account the same day you call. Simply give us a ring and answer a few brief questions. Your Big 'N' representatives will call you back — fast — with the amount of credit available to you.

Then, call toll-free one of our systems consultants to select the Northgate configuration that perfectly matches your needs.

Northgate leases systems, too! If you need multiple systems for business applications, you owe it to your business to consider leasing from Northgate. We offer flexible terms up to five years.

CALL TOLL-FREE
800-828-6125

CONTINENTAL U.S. ONLY

Hours: Monday-Friday 7 am-8 pm CST



"Smart Tools For Business"

7075 Flying Cloud Drive
Eden Prairie, MN 55344

Notice to the hearing impaired: Northgate has TDD capability: Dial 800-535-0602.



PERFORMANCE TESTS: COMPOSITE VIEW

As expected, PC Magazine Labs' test results for the nine presentation monitors reviewed here indicate that line widths and convergence suffer more at the corners than at the center of the screen. Although this is true for all monitors, the disparity is especially dramatic with monitors this large because they are more susceptible to the electromagnetic fields found in common office environments. As a result, we are reporting the measurements made in each screen's lower right-hand corner to show the worst-case display characteristics.

The Mitsubishi HC3505SK showed the best display characteristics. The single data-only monitor in the group, it also had the finest dot pitch—0.31 mm. The HC3505SK had the thinnest and straightest horizontal lines as well as the most-tightly-converged horizontal electron beams. It didn't possess the most stable image or optimal pixel sizing (as measured by our Drift Ratio and Line Width Variance tests), but its picture quality is what you would expect from an \$11,000 display.

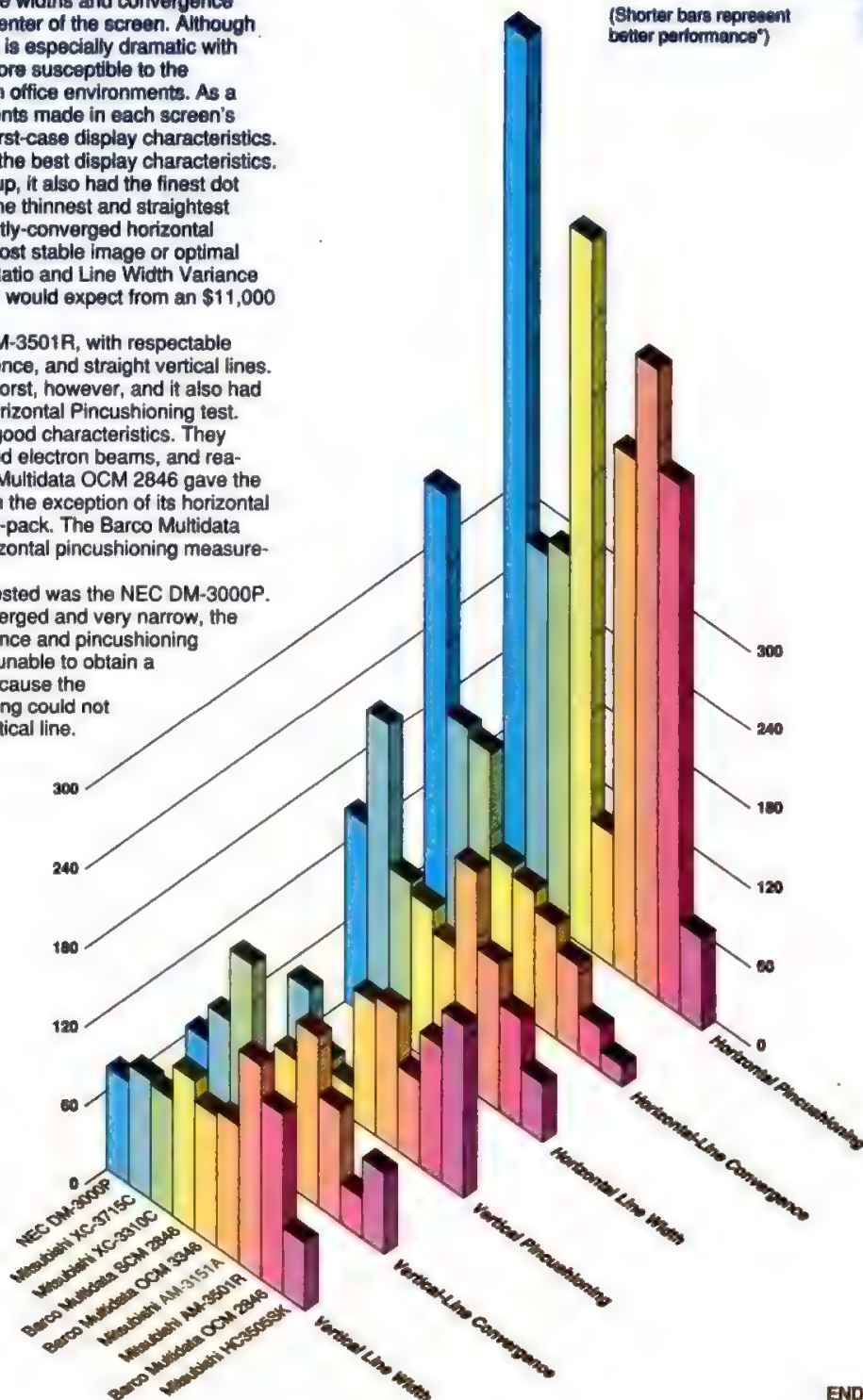
The next-best Mitsubishi was the AM-3501R, with respectable scores for stable picture, tight convergence, and straight vertical lines. Its line width variance was one of the worst, however, and it also had one of the highest distortions on the Horizontal Pincushioning test.

The three Barco displays had very good characteristics. They showed stable images, tightly converged electron beams, and reasonably proportioned lines. The Barco Multidata OCM 2846 gave the best performance of all the Barcos, with the exception of its horizontal pincushioning, which was middle-of-the-pack. The Barco Multidata SCM 2846 also had relatively poor horizontal pincushioning measurements.

The most inconsistent monitor we tested was the NEC DM-3000P. While its vertical lines were tightly converged and very narrow, the horizontal lines had the worst convergence and pincushioning measurements of the bunch. We were unable to obtain a vertical pincushioning measurement because the Microvision Superspot we used for testing could not see enough points on the produced vertical line.

Relative Performance
(Barco Multidata OCM 3346 = 100)

(Shorter bars represent better performance*)



* Except for the Horizontal and Vertical Line Width tests, where good performance is determined largely by user preference for thinner or thicker lines.

N/A—Not applicable: We were unable to obtain a vertical pincushioning measurement on the NEC DM-3000P.

ENDS

100% IBM
compatible format.
All standard
templates fit!

At Last... A Vintage 101 Keyboard!

Announcing Northgate® OmniKey®/101...
keyboard technology aged to perfection!

\$8900

FOB Minneapolis

More than meets the eye! On the surface, *OmniKey/101 NI* may look like an exact duplicate of the standard IBM® 101. All the keys are in the same place. But the similarities end there. You get exclusive Northgate features that let you input data faster than you ever dreamed possible.

Faster, more precise typing by design! Your new *OmniKey* features renowned ALPS click/tactile mechanical key switches. These marvelous devices affirm every entry with feedback you can hear and feel.

No more U>S>A>! Imagine the convenience of being able to lock out these < > even when shifted. You'll never type U>S>A for U.S.A. again!

You get 'N' key rollover feature for speed typing accuracy and colon lock feature so you don't need to hit Shift.

Customize the CTRL, CAPS LOCK and ALT key configuration. Retain standard IBM enhanced layout or switch CTRL, CAPS LOCK and ALT keys where they suit your typing preferences.

More great features! We added a rate select feature that lets you change repeat rate from 3 to 120 CPS at the touch of a key. *OmniKey/101 NI* has a sturdy metal base and weighs a hefty 5½ lbs so it won't slide around on your desk.

You get unmatched compatibility with IBM®-AT, XT, Tandy, Compaq® AT&T 6300 and other IBM type systems, lifetime quality double injected keycaps and industry-leading 5-year warranty. We've even included an *OmniKey* dustcover to protect your 101 when you're not using it. FCC Class B certified, too.



Sample For 60 Days ...
Full Money Back Guarantee

CALL TOLL-FREE TODAY!

800-828-6133

IN U.S.A. AND CANADA

CHARGE IT! We accept your Visa, MasterCard or Discover credit card.

HOURS: MON.-FRI. 7 AM-10 PM; SAT. 8 AM-4 PM
Central. Call for quantity discounts, dealer and distributor prices. Se habla español por su conveniencia.

Notice to the Hearing Impaired: Northgate has TDD capability: 800-535-0602.

DEALER INQUIRIES WELCOME

 **NORTHGATE
COMPUTER
SYSTEMS, INC.**
"Smart Tools For Business"™

7075 Flying Cloud Drive, Eden Prairie, MN 55344

© copyright Northgate Computer Systems, Inc. 1991. All Rights Reserved. Northgate, OmniKey and the Northgate 'N' logo are trademarks of Northgate Computer Systems, Inc. IBM is a registered trademark of International Business Machines Corp. All other product and brand names are trademarks and registered trademarks of their respective companies. Prices and specifications are subject to change without notice. Northgate reserves the right to substitute components of equal or greater quality and performance. All terms subject to availability. We support the ethical use of software. To report software copyright violations, call the Software Publishers Association. Anti-Piracy Hotline at 1-800-368-1988.

HARDWARE

PRESENTATION MONITORS



The 35-inch Mitsubishi AM-3501R costs \$6,900 and includes remote control.

cluded three individual BNC inputs (each with its own RCA jacks for stereo audio), one S-video input with stereo RCA jacks, and one 8-pin VCR input/output. All together, these allow you to connect up to five NTSC video sources and three RGB signals simultaneously and switch between them by using the supplied remote control. The infrared remote also allows you to adjust TTL colors, analog RGB sync, picture quality, volume, and picture parameters. And like its twin, the XC-3715C, the AM-3151A can superimpose analog RGB text over composite video material at the touch of a button.

A set of digital controls are concealed behind a flip-down panel on the front of the AM-3501R. Additional controls here include a notch filter switch to help reduce moiré-pattern picture distortion and a noise-reduction switch to clean up weak, snowy pictures. Both of these con-

trols help correct poor NTSC signals, but they also reduce picture sharpness.

Monitors this size emphasize the limitations of CRT technology. Consequently, the AM-3501R is susceptible not only to localized electromagnetic interference but also to the earth's own magnetic field. To help minimize such distortion, Mitsubishi includes a beam-strength switch and a compass direction toggle (north, south, or neutral) to maintain color purity. Thanks to the lucid user manual, it's a simple matter to make these adjustments.

The AM-3501R is the largest monitor in our group, not only in terms of viewable screen size but also in terms of sheer bulk, tipping the scales at 266 pounds. If you don't have the type of Brodringnagian furniture required to support this kind of weight, Mitsubishi offers a specially designed cart with four-inch casters for \$370. For long distances, the company also has a shipping case available for \$665.

Unlike the Mitsubishi XC-3715C, which parades itself as a really big desktop monitor, the AM-3501R is simply a big for-public-viewing-only monitor. Even though it may be one of only two 35-inch-diagonal screens in town, Mitsubishi did not cut any corners here (in fact, the screen is half an inch larger than the company's advertised spec). If you require a large display for multimedia demonstrations, the AM-3501R will keep your presentations in focus.

MITSUBISHI ELECTRONICS AMERICA INC.

Mitsubishi HC3505SK

by Alfred Poor

Ferrari Testarossa. Bose speakers. And the Mitsubishi HC3505SK monitor. They're all small high-performance products, and since they carry sizable price tags, you are not likely to buy one unless you really need one. In the case of the monitor, its 26-inch-diagonal screen is the smallest of any product reviewed here, and it has the highest list price at a breath-stealing \$11,300.

No, we didn't slip the decimal place.

The simple fact is that the HC3505SK fulfills a substantially different mission



The 26-inch \$11,300 Mitsubishi HC3505SK is designed as a high-end CAD monitor.

than the rest. The others are intended for use as large-format demonstration screens. Few of the others have resolutions that support beyond VGA's 640 by 480.

The HC3505SK is a data monitor, pure and simple. While it does not accept video, the HC3505SK does accept a wide range of signals, from digital CGA right through analog 800 by 600, thanks to its horizontal scanning frequency range of 15.7 to 38 kHz. This monitor can also adapt to a variety of vertical scanning frequencies, from 45 to 90 Hz—more than enough for the new generation of 70- and 72-Hz Super VGA adapter cards. The monitor also has a 50-MHz bandwidth, much higher than some of the others, which means that you should get sharper pictures at higher resolutions. (Mitsubishi also makes another 26-inch data monitor, the HJ-3505, which we didn't review because it only works at resolutions higher than VGA and therefore did not meet our requirements for this story.)

There is another reason you will get sharper images on this screen. Even though the HC3505SK's screen is 26 inches diagonally, it uses the same 0.31-mm. dot pitch for its phosphors as a typical 14-inch VGA display. The result is an incredibly fine image, compared with the other units in this review that use 0.8- to 1.1-mm. dot pitch screens. It would take a 14-inch screen with a 0.10-mm. dot pitch to give you an image with as fine a grain as the HC3505SK's.

As with any high-performance equipment, you can expect to find state-of-the-art controls. In this case, the contrast and brightness knobs are on the front, along with the power and manual degaussing switch. The rest of the adjustments are made with a digital-switch arrangement



FACT FILE

Mitsubishi AM-3501R

Mitsubishi Electronics America Inc., Professional Electronics Div., 800 Cottontail Ln., Somerset, NJ 08873; 201-563-9889.

List Price: \$6,900 (DB-25 to DB-9, BNC to BNC, and stereo RCA cables supplied); optional cart, \$370; optional shipping case, \$665.

Requires: Apple II GS, Mac II, Hercules, MDA, CGA, EGA, MCGA, VGA, Super VGA, or 1,024-by-768 (interlaced) graphics adapter.

Measured Diagonal Screen Size: 35 inches.

In Short: The biggest of the big, the Mitsubishi AM-3501R is able to display bright consistent images large enough for meetings and other group gatherings. Just don't expect to do your CAD work on it.

CIRCLE 614 ON READER SERVICE CARD

Only Northgate® has the "Guts" to make better keyboards.



Most companies treat keyboards as an afterthought. Not Northgate. We've spent countless hours and hundreds of thousands of dollars researching and developing ways to make using a keyboard more enjoyable.

Our keyboard engineers explored every angle of traditional keyboard design, from F-key positioning and case ergonomics to cursor control keypads and keyswitches. Then we tackled problems the competition never knew existed like locking out < > so when you want to type U.S.A. you don't get U>S>A>.

We added a rate select feature that lets you change repeat rate from 3 to 120 CPS at the touch of a key. You can even customize *OmniKey*. You get

Charge it! We accept VISA, MasterCard and Discover.

HOURS: MON.-FRI. 7 AM-10 PM;
SAT 8 AM-4 PM Central.



OmniKey®/102 with
F-keys on left

Just **\$89⁰⁰**
FCB Northgate



OmniKey/ULTRA with
F-keys on top and left

Only **\$129⁰⁰**
FCB Northgate

interchangeable CTRL, ALT and CAPS LOCK on left, CTRL and ALT on right. Plus, you can swap the Backslash and Asterisk keys.

Our efforts have been well received. Northgate *OmniKey* keyboards are clearly the choice of experts and users alike. A *PC Magazine* Editor's Choice, two *Computer Shopper* Best Buy Awards and *PC Computing's* Most Valuable Product awards are proof.

60-day no-risk trial! Use *OmniKey/102* or *OmniKey/ULTRA* for 60 days. If you're not 100% satisfied, we'll buy it back! Keep it and it's protected by a full 5-year parts and labor warranty.

You just can't lose ... order now! Call for quantity discounts, dealer and distributor pricing.

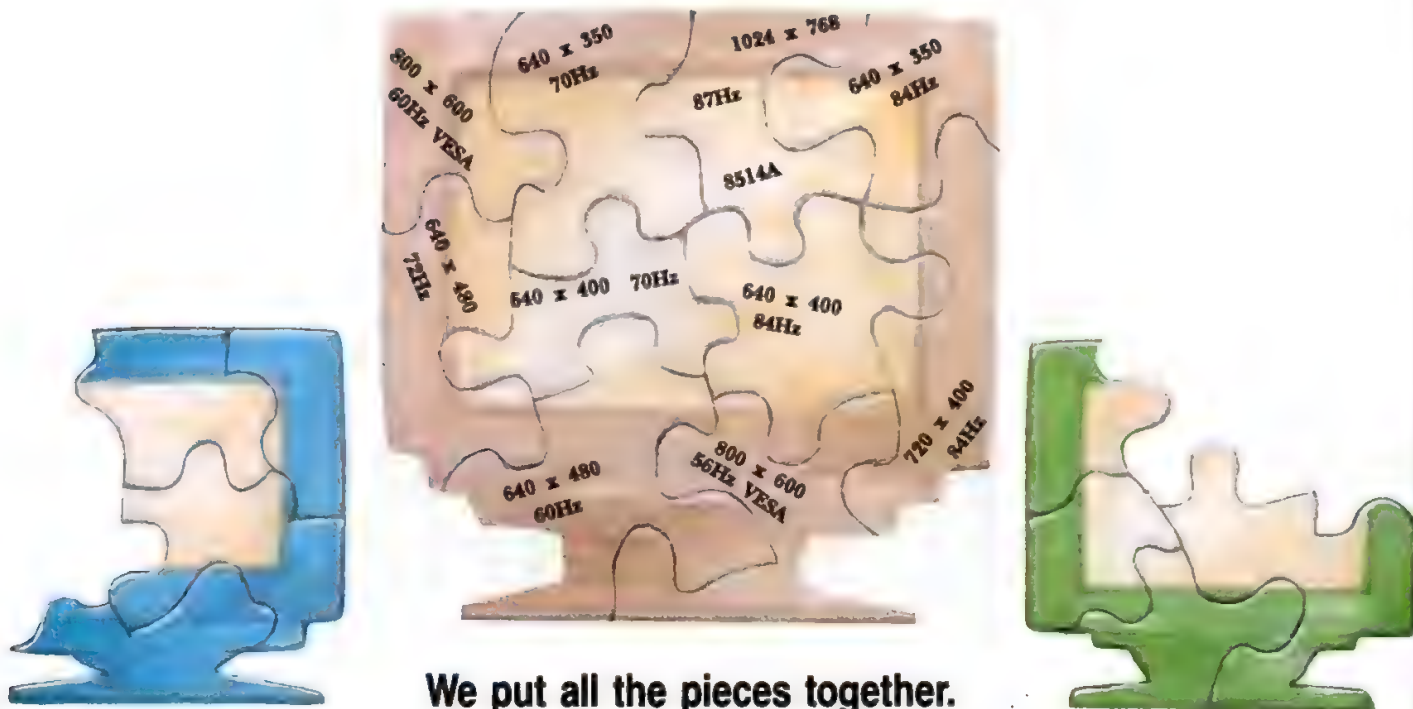
CALL TOLL FREE **800-828-6133** IN U.S.A. AND CANADA

Notice to the Hearing Impaired: Northgate has TDD capability 800-535-0602
DEALER INQUIRIES WELCOME

NORTHGATE COMPUTER SYSTEMS, INC.
"Smart Tools For Business"™
7075 Flying Cloud Drive, Eden Prairie, MN 55344

© Copyright Northgate Computer Systems, Inc. 1991 All Rights Reserved. Northgate, OmniKey and the Northgate "N" logo are trademarks of Northgate Computer Systems, Inc. IBM is a registered trademark of International Business Machines, Inc. All other product and brand names are trademarks and registered trademarks of their respective companies. Prices and specifications are subject to change without notice. Northgate reserves the right to substitute components of equal or greater quality and performance. All items subject to availability. We support the ethical use of software. To report software copyright violations, call the Software Publishers Association's Anti-Piracy Hotline at 1-800-388-PIR8.

CTX Offers *Total Compatibility.*



We put all the pieces together.

Chances are, you chose a monitor that suffers from a compatibility problem. Selecting a monitor that suits both present and future needs can be tough. Consider CTX, and you will be puzzle-free! With its 28-38 KHz continuous horizontal scanning frequencies, CTX 5468 Multimode VGA has Total Compatibility — no pieces will be missing from your display.

The CTX 5468 Multimode VGA offers the ultimate display solution. Features include: super fine CRT (0.28mm dot pitch) providing resolutions up to 1024 x 768 (Interlaced), 90-260 VAC auto-sensing power supply, handy up-front controls and detachable tilt-swivel base. All these plus its affordability make CTX 5468 Multimode VGA your natural choice of monitors.

Excellent CTX servicing programs come standard for all users. For more information on the best monitor deals, contact a CTX dealer today.

CIRCLE 172 ON READER SERVICE CARD



CTX International, Inc.

161 Commerce Way, Walnut, CA 91789
Phone (714) 595-6146 Fax (714) 595-6293

CTX South, Inc.

6090-F Northbelt Parkway, Norcross, Georgia 30071
Phone (404) 729-8909 Fax (404) 729-8805

Chuntex Electronic Co., Ltd. (Factory)

6F, No. 2, Alley 6, Lane 235, Pao Chiao Rd.
Hsintien, Taipei Hsien, Taiwan
Phone 886-2-9175055 Fax 886-2-9172736



FACT FILE

Mitsubishi HC3505SK

Mitsubishi Electronics America Inc.,
Information Systems Div., 991 Knox St.,
Torrance, CA 90502; 800-843-2515.

List Price: \$11,300.

Requires: Mac II, CGA, EGA, MCGA, VGA,
Super VGA, or 1,024-by-768 (interlaced)
graphics adapter.

Measured Diagonal Screen Size: 26 inches.

In Short: The Mitsubishi HC3505SK is
designed to display high-resolution images
with exceptional quality, thanks to its fine dot
pitch and wide range of scan frequencies.
Although expensive, it is one of the best large-
format, high-resolution, color, data-only
monitors you are likely to find.

CIRCLE 616 ON READER SERVICE CARD

hidden behind a trap door on the right
side of the cabinet. There are controls for
horizontal and vertical position and size,
as well as extra features, such as two
forms of pincushion adjustment.

After all this, it's hardly surprising that
the picture on the screen during our tests
was excellent. The HC3505SK showed
terrific convergence at all screen points;
the lines were crisp and clear with vertical
and horizontal line widths being close to
equal. And the line widths didn't spread
much at the screen's edge compared with
its center.

This is not your average boardroom
demonstration monitor. If all you need to
do is show some VGA videos or business
graphics, your money will go farther else-
where; for the same price you can buy
two or three of nearly any other monitor
in this review. But if you are looking for
what may well be the ultimate 26-inch
VGA monitor for design applications or
need a screen big enough to read from the
other side of a large desk, then this is
definitely the way to go.

MITSUBISHI ELECTRONICS AMERICA INC.

Mitsubishi XC-3310C

by Alfred Poor

Stand a typical AT-size computer on its
front side and gaze upon the broad ex-
panse of its top: That's about the size of
the image on this monitor. With a list
price of \$5,495, the Mitsubishi XC-3310C
gives you a huge 33-inch-diagonal pic-
ture, but besides size there is little else to
set it apart.

HARDWARE PRESENTATION MONITORS

In many ways, the XC-3310C is a
conventional large-format monitor. It
relies on standard analog controls for level
adjustment and picture-tuning geometry.
Most of the controls are located at the
front of the case, below the screen. The
unit can display up to 640-by-480 resolu-
tion and uses a vertical stripe pitch that
ranges from 0.88 mm. in the center to 0.99
mm. at the edges—fairly coarse but ap-
propriate for 640-by-480 resolution on a
screen this size.

There are internal speakers as well as
connectors for external speakers. The
monitor accepts either NTSC or PAL video
signals and can pass video through to
another monitor. There is a 9-pin connec-
tor for digital computer signals and BNC



The \$5,495 Mitsubishi XC-3310C gives you
a 33-inch display in a compact case.

connectors for RGB. The XC-3310C can
sync on vertical scanning frequencies
ranging from 40 to 75 Hz and horizontal
scanning frequencies of 15.75 to 35 kHz.

The monitor is housed in an attractive
and compact beige case. Its frame is kept
to a minimum, making the width and
height only inches larger than the screen
itself. As a result, the 26- by 28- by 22-
inch XC-3310C may fit in tight spots
where other 33-inch-diagonal screens
might not be able to.

In terms of performance, the test unit
had fairly good picture quality, though
there were noticeable problems with
convergence—especially along the right
edge. These observations were borne
out by the test measurements; the XC-
3310C had some of the poorest conver-
gence measurements of all the tested
monitors. On the other hand, its line
width and picture stability figures were



FACT FILE

Mitsubishi XC-3310C

Mitsubishi Electronics America Inc.,
Information Systems Div., 991 Knox St.,
Torrance, CA 90502; 800-843-2515.

List Price: \$5,495.

Requires: Mac II, CGA, EGA, VGA, or Super
VGA graphics adapter.

Measured Diagonal Screen Size: 33 inches.

In Short: The Mitsubishi XC-3310C is an
adequate monitor with an average price and
typical features, but if you are looking to buy,
there are better monitors out there.

CIRCLE 616 ON READER SERVICE CARD

just about average.

There is nothing particularly good or
bad about Mitsubishi's XC-3310C. It
produces adequate images and offers
the basic features you expect in a large-
format monitor. It doesn't offer as many
bells and whistles as some of its competi-
tors, however, and as a result is not as
versatile. The chances are excellent that
you would find a better value in a differ-
ent monitor.

MITSUBISHI ELECTRONICS AMERICA INC.

Mitsubishi XC-3715C

by Alfred Poor

With a diagonal screen measurement of
35 inches, the Mitsubishi XC-3715C pre-
sents more than 3.5 square feet of display
for a list price of \$7,599. Not only does
this monitor think big in terms of image
size, it's big on useful features as well.

Many aspects of this unit are similar to
those of its competitors. The XC-3715C
includes basic picture geometry and level
controls and can handle various video
(NTSC, PAL, SECAM, and S-video) and
RGB (TTL and analog) signals through
an array of input connectors. It has inter-
nal speakers but can also use either exter-
nal speakers or pass stereo signals along
to an amplifier.

The monitor's specifications cite 45 to
120 Hz vertical and 15.7 to 36 kHz hori-
zontal scanning frequencies, which place
it near the top in terms of capabilities.
Mitsubishi only claims 640-by-480 maxi-
mum resolution, however, so the higher
frequencies don't mean that you will be
able to get a good image from 800-by-600
or higher-resolution images. Part of the
reason is the coarse pitch of the phos-

HARDWARE

PRESENTATION MONITORS



The 35-inch Mitsubishi XC-3715C costs \$7,599 and can make any screen adjustment from its remote control.

phors. The screen uses a vertical stripe mask with an 0.85-mm. dot pitch in the center that spreads to 1.1 mm. at the edges.

Unlike most of the monitors in this group, the XC-3715C has digital controls. These are conveniently arranged across the bottom of the screen, and there are separate buttons for most functions, making them easier to use than the dial-a-function design used by many competitors.

Perhaps the slickest feature of all, however, is that you can perform almost all control functions without even touching the monitor. The XC-3715C comes with an infrared remote that duplicates the front panel controls, right down to the power and source-select buttons. You also get on-screen prompts for many setting functions.

But the features don't stop there. This monitor can take both video and RGB signals from different sources and display

them at the same time. The RGB signal must come from the 15-pin connector (as opposed to the five BNC connectors) and is overlaid on the video signal. This may be especially attractive for simple multimedia applications, since you can use a videotape or video laser disc to provide "live" images while you make a computer-based presentation on the same screen. Add a soundtrack and you have a quick and easy show that is unforgettable.

Surprisingly, the XC-3715C is not as big as you might expect. The case is hardly pocket-sized, but at only 34 inches wide, it will fit into tighter spaces than other 35-inch-diagonal displays.

In terms of performance, the XC-3715C produced acceptable but not outstanding images. The red beam spread a bit at the monitor's edges, especially along the lower right. Convergence measurements were only fair, and while there were no particular trouble spots, this could explain why some of the picture quality was lost. The image was about as stable as the rest of the field, which is a plus when you take into account the screen's extra size.

The XC-3715C is a reasonable choice if you need a 35-inch presentation monitor. The picture is good enough for most VGA-level business presentations, though you probably would not want to rely on it for CAD or detailed text work. The remote control and video overlay are attractive features; coupled with its compact case and digital circuitry, they may be enough to sway your decision in its favor.

NEC TECHNOLOGIES INC. NEC DM-3000P

by Alfred Poor

NEC is certainly one of the big names in computer monitors, and here is a big monitor bearing the NEC label. Unfortunately, besides the logo, the DM-3000P shows little evidence of the usual NEC quality. The monitor has a 30-inch-diagonal screen and a load of features, and its price tag is not small. At \$5,600, the DM-3000P isn't nearly the lowest-priced monitor in this roundup, and it sports moderate features to boot.

With the DM-3000P, you get a unit with specifications comparable to those found in some of the competing models. For example, the 50- to 87-Hz vertical and

the 15- to 35.5-kHz horizontal scanning frequency ranges are on a par with the others. The DM-3000P's 0.80-mm. dot pitch is large when compared with smaller monitors but still a bit better than average for this class of display.

Perhaps the slickest
feature of the
Mitsubishi XC-3715C
is that you can
perform almost all
control functions
without even
touching the monitor.

The unit comes with internal stereo speakers (though these sounded tinny at best), external speaker connections, and stereo signal-out connectors for an amplifier. The unit supports both composite and S-video signals, and it can pass these signals through to other video monitors.

While it is possible to connect directly with the monitor, you will want to use the IPS-100 VGA interface that is included with the unit. This interface is a separate video controller box that modifies a VGA or 8514/A signal to give you better images on-screen. The monitor itself only provides one set of analog controls for basic picture geometry settings, but the IPS-



Mitsubishi XC-3715C

Mitsubishi Electronics America Inc.,
Information Systems Div., 991 Knox St.,
Torrance, CA 90502; 800-843-2515.

List Price: \$7,599.

Requires: Mac II, CGA, EGA, VGA, or Super VGA graphics adapter.

Measured Diagonal Screen Size: 35 inches.
In Short: A reasonable choice for big-screen viewing, the Mitsubishi XC-3715C shows VGA graphics on a huge 35-inch screen. Couple this with some slick features, like a remote control, video overlay, digital circuitry, and a compact case, and this massive monitor might well end up in your conference room.



NEC DM-3000P

NEC Technologies Inc., 1255 Michael Dr.,
Wood Dale, IL 60191; 708-860-9500.

List Price: \$5,600 (with IPS-100 VGA interface).

Requires: Mac II, MDA, CGA, EGA, MCGA, VGA, Super VGA, or 1,024-by-768 (interlaced) graphics adapter.

Measured Diagonal Screen Size: 30 inches.
In Short: The NEC DM-3000P is a 30-inch display with adequate features, erratic picture quality, and only an average price. As such, it represents little value; those looking for a solid monitor bargain should keep searching.

CIRCLE 617 ON READER SERVICE CARD

CIRCLE 618 ON READER SERVICE CARD



NOW READ WHAT THE REAL EXPERTS SAY ABOUT XTREE.

"It stands alone as the fastest, most imaginative and most capable file manager you can find."

PC Magazine

Some software companies would have you believe their file management packages do everything but make coffee. But nobody's fooling the pros. With its long list of practical, usable features, XTree has been their favorite for years. InfoWorld says, "This comprehensive DOS shell is packed with advanced features that appeal to power users."

Features like an application menu that lets you launch applications right from XTree. And when you're launching applications it shrinks back to 7K. Like an Open File command that makes starting applications and their associated data files as easy as pointing and shooting. Like split screens, so you can view two directories or drives at once. Like text search. And AutoView, so you can browse through files without starting up the application.

Now, there's an even better reason for managing your files with XTree. It's XTreeGold 2.0, with some important new features that make it better and more useful than ever.

Introducing New XTreeGold 2.0. With Simplified Pull-Down Menus, "Un-Delete", And Autobuild Menu Creation.

With XTreeGold 2.0, you can choose between our original keystroke command line or our new pull-down menus.

You can "un-delete" files that have been accidentally erased.

Create an application menu automatically with Autobuild, which will search your disk for more than 700 popular applications.

View more data files than ever with our newly expanded viewer list.

And add PKZip compatibility to our file compression system, to get more out of your hard disk.

What's more, we've made many of our standard features faster, better, and easier.

In short, the file manager that impressed the pros is more impressive than ever.

For more information or the name of the XTree dealer nearest you, call 1-800-388-3949.



The world leader in disk management.

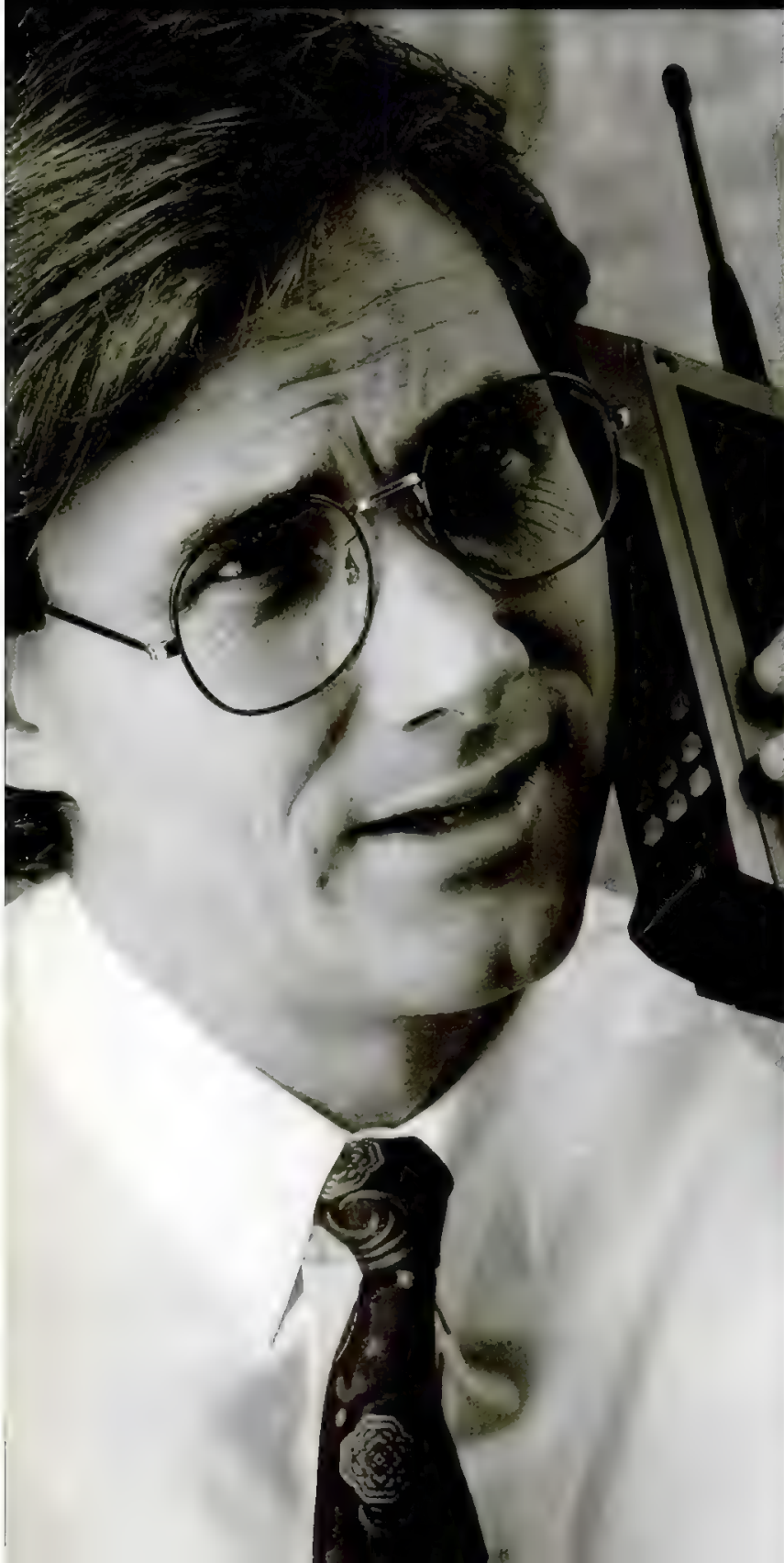
XTree and XTreeGold 2.0 are trademarks of Executive Systems, Inc.



CIRCLE 199 ON READER SERVICE CARD

We're doing some horse trading of our own. XTree owners can upgrade to XTreeGold 2.0 for \$39. Call 1-800-282-5003.

"Only good accounting software can bring our network and business up to speed."



"That's the word from our accounting firm. Most of our PCs are already on a LAN, primarily for office automation. But our departments still aren't working together..."

"Look, you made the LAN investment to improve your office efficiency. Now expand it into a total information system you can profit from."

"Explain."

"You need a LAN accounting system that integrates sales, purchasing and production departments with your accounting department. Then, all your departments can communicate on the same wavelength. You get a teamwork approach that improves financial management, productivity and customer service."

"Any suggestions?"

"Macola. No other accounting software developer has more experience with LANs. Or a better record of performance. Only Macola has earned LAN Magazine's 'Product of the Year' award twice in a row."

"But our needs are unique."

"Nobody offers more customization options... even vertical market solutions than Macola. Like fully integrated systems for distribution. For manufacturing. Plus retail and professional services."

"Is it hard to implement?"

"We did it in phases. Our Macola authorized consultant targeted our immediate needs, then provided training as we implemented each package. The transition was painless. And now, all our departments are working as a team... thanks to Macola on a LAN. I'd go into more detail, but it's seven o'clock."

"So?"

"Doing a little 'networking' at the game tonight."

"Thanks a lot!"

"Call Macola. They've got the answers you need."

1-800-468-0834 (USA), 1-800-336-8337 (CANADA)



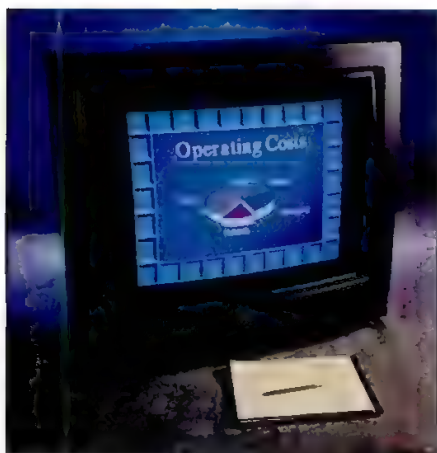
FREE, if you call today!
The Interactive Preview Diskette demonstrates the many advantages and unique vertical market solutions of Macola Software.

MACOLA[®]
SOFTWARE

P.O. Box 485 Marion, OH 43301-0485 614/382-5999

**Accounting Software
You'll Never Outgrow.**

PC Magazine is a publication of Ziff Communications Co. LAN Magazine is a publication of Miller Freeman Publications. Macola is a registered trademark of Macola, Inc. Copyright 1990
CIRCLE 263 ON READER SERVICE CARD



The 30-inch \$5,600 DM-3000P from NEC is hurt by erratic performance.

100 interface adds additional controls that allow you to adjust for optimal image size as you move between different display-adaptor modes.

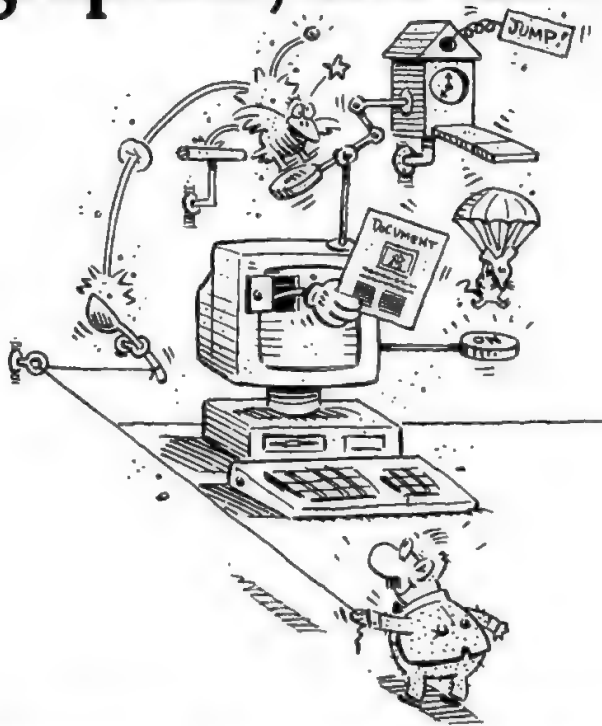
In an apparent contradiction, NEC specifications claim the ability to handle signals up to 1,024-by-768 interlaced, but they only claim a monitor resolution of 640 by 480—which means that you can feed the higher-resolution signals into the controller, but the monitor won't be able to resolve a crisp image for anything finer than 640 by 480. In addition, the DM-3000P has a bandwidth of only 20 MHz, which is lower than competing designs and limits its ability to produce clear high-resolution images.

Performance results were erratic. The image was sharp and well-converged at the center of the screen, but the beams spread a bit and lines got thicker toward the corners. There were also significant horizontal convergence and pincushioning problems with this model, especially in the lower right corner.

Overall, the DM-3000P is a less than attractive value. Larger than some of the units in this review, the DM-3000P comes with adequate image quality and a barely sufficient collection of features. If you are looking for a large-size video and VGA display, you could easily find a better buy than the DM-3000P. ■

Alfred Poor is a contributing editor of PC Magazine. John R. Quain is a contributing editor of Video Review and a frequent contributor to PC Magazine. Oliver Rist is a staff editor of PC Magazine. Robin B. Bornstein is an assistant editor of PC Magazine.

You can go to great lengths to produce a document with text, graphics, and data.



Or you can get Legacy.

You'll find all kinds of bells and whistles built into other advanced word processors. And while they might seem appealing at first, using them to create high-impact documents means you spend a lot of time just spinning your wheels.

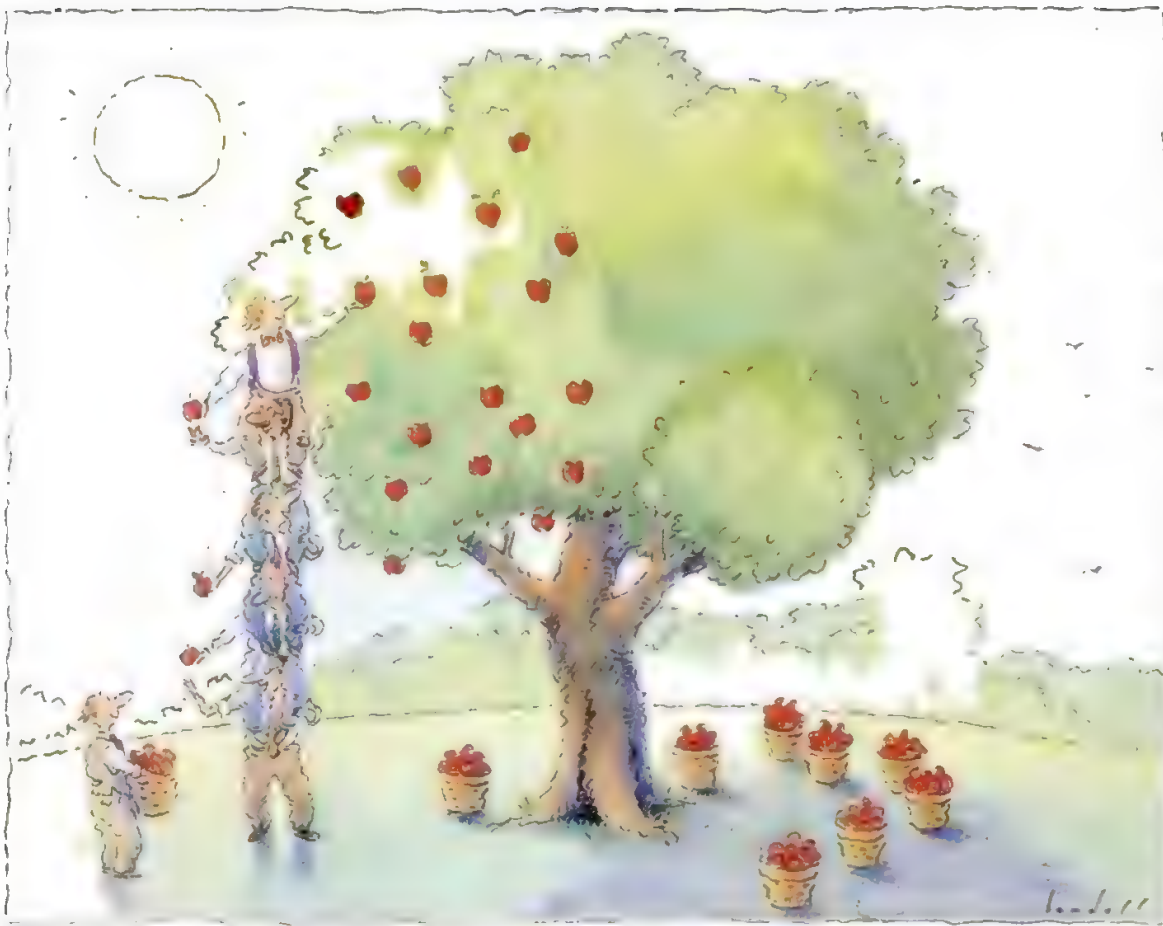
But not with Legacy. Because Legacy was designed specifically to give you the best combination of word processing, graphics and desktop publishing in one complete program. Its unique frame-based design and powerful word processing lets you create high-impact documents easier and faster than with any other advanced word processor. All on one screen, without ever exiting your document.

Using Windows™ 3.0, Legacy makes things simple with pull-down menus and dialog boxes. And full WYSIWYG ability makes editing easy in any view. In fact, everything is easy with toll-free support, on-line tutorials and context-sensitive help. All for only \$495.

Call 1-800-NBI-1111 or your software dealer for more information. And see how, with Legacy, you can get a jump on your work. Without having to jump through hoops.

Trade up your current word processing or desktop publishing software to Legacy for just \$150.

LEGACY
from **NBI**®



Put Primavera multiuser to work. And see an instant improvement in team performance.

Large projects demand more than an assembled project team. *Teamwork* is what makes things happen.

That's the essential idea behind the multiuser capabilities of Primavera Project Planner®. Unlike many "multiuser" project management packages, Primavera offers *simultaneous* access to project files—and allows *simultaneous* generation of reports and graphics. The project team gets more done because team members aren't waiting in line for computer time.

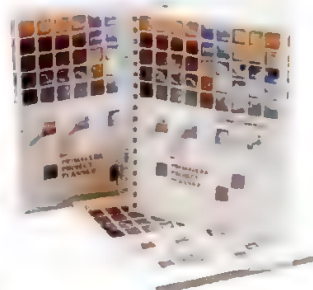
Everything needed to plan and execute your project is included in the software: lightning-fast scheduling, resource management, cost control, reporting and graphics. Special features simplify coordination, communication and cooperative control by the team.

Primavera's record-locking design protects activity data. Project access levels are password-protected too.

Frequent interaction among team members is made easy with the software's own electronic mail system. You don't have to exit Primavera to leave a message for an associate or check the internal project bulletin board.

What's more, every Primavera Project Planner package lets you choose single user or multiuser functionality for your Novell, 3Com or Banyan network. You can grow into a multiuser environment without any cost penalty.

Call **1-800-423-0245** for a free video preview of the software. Or, ask for a personal demonstration—and see firsthand how Primavera can help pull a project team together.



PRIMAVERA

*How the world says
project management*

Two Bala Plaza • Bala Cynwyd, PA 19004 • (215) 667-8600 • Fax: (215) 667-7894

CIRCLE 148 ON READER SERVICE CARD

by
Winn L. Rosch

Lab Notes

Think of IDE as the little disk interface that could. Scorned two years ago by proponents of the ostensibly faster ESDI hard disk connection, IDE chugged patiently along, pulling a series of low-cost storage solutions to the market. Today, however, with hard disks becoming a bottleneck in the path toward even higher-performance PCs, the hardworking little IDE engine has come to be recognized as having an even greater performance potential than ESDI.

IDE stands for *integrated drive electronics*. This denotes the concept of combining a hard disk's drive electronics—traditionally mounted on a separate card—with the drive assembly itself. Popularly, and in most previous *PC Magazine* articles, *IDE* has been used simply to designate a hard disk that could plug almost directly into the expansion bus of a PC. The term has thus been restricted to a very specific form of the IDE idea, one that uses the AT expansion bus as its connection.

In fact, there are several varieties of disk drives with integrated or embedded control electronics, or IDE hard disk drives, each distinguished by the type of connection it makes with its computer host. The most common IDE implementation—the one based on the AT bus—is more accurately termed the *AT attachment* or ATA interface. There are similar (but incompatible) IDE designs for the XT bus and for the Micro Channel bus. Strictly speaking, the SCSI (small computer system interface) is also an IDE implementation.

In this Lab Notes, I'll use the term *IDE* to designate the general technology; the more precise term *ATA* will refer here specifically to IDE drives (and their connection schemes) that mate with the AT bus.

IDE'S ON THE MARCH

The trend toward IDE drives in general and the ATA interface in particular has accelerated in the last couple of years because of the clear advantages they offer to computer buyers, computer makers, and disk drive manufacturers alike.

To the computer buyer and user IDE

The IDE Interface and The Quest for Better Hard Disk Performance

■ Both in terms of transfer rate and the potential for more storage capacity, IDE offers significant advantages over ESDI.

connections offer the highest data transfer rates of any hard disk interfacing scheme for personal computers. The top transfer rates are achieved in SCSI systems; ATA disks come in second. ATA data transfer speeds can be as much as two to three times faster than the ESDI (enhanced small device interface). Moreover, as you'll see, IDE technology promises to put more megabytes in your PC for a lower price than the more-conventional hard disk interfaces.

If you work on your own machine, ATA drives offer even more advantages, for they eliminate most of the worries involved in connecting traditional hard disks. Since they require only two cables—a signal cable and a power cable—connecting ATA drives is easy. You don't have to worry about the terminating resistors that many disk drive systems require to keep logic signals at the proper level and to prevent electrical signals from being reflected from the ends of the cable, causing interference. Gone, too, is the question about which drive gets plugged into the daisy-chain cable (that's the cable that links two or more drives to a single port connector on a disk controller or host adapter); in an ATA setup, the drives, not the cable, determine which drive letter is

assigned to each. Nor need you worry about such things as RLL data encoding or modulation technique, as you had to with the ST506 drives of days gone by. In fact, since they tolerate a wide range of setup parameters, most of the latest ATA drives make the system setup procedure easier than ever.

Computer makers benefit from IDE technology because they don't need to put separate hard disk controllers in their products. Indeed, the latest chip sets that serve as the basis for system board designs provide internal ATA support, which gives the system manufacturers the whole hard disk interface at essentially no charge. (The only added expense is the small cost of the system board connector itself.) Since there's one less cable and one less expansion board to install in the system, ATA-interfaced drives also lower assembly cost in manufacture. The net result is a considerable savings that the computer maker can use to price his machine more competitively.

At first sight IDE might seem less attractive to the hard disk manufacturer. After all, building the control electronics onto the drive itself makes a more complex product that should be more expensive to manufacture. Fortunately, however, other benefits of IDE and improvements in other areas of disk design have made IDE the darling of hard disk manufacturers, as well.

As with other types of electronics, the trend in hard disk drive control technology has been toward larger and larger scale integration, that is, toward combining all the needed circuit functions into one large chip

Lab Notes

(or a small set of large chips). The initial engineering involved in designing a VLSI (very large scale integration) chip is expensive but is more than offset by savings in manufacturing and assembly. VLSI means fewer components, so there's less to install. There's also less to fail, so IDE drives can cost less to warrant and maintain.

But what most appeals to disk manufacturers about the IDE interface is the freedom it gives hard disk designers to get the most capacity possible from a given mechanism. All the vital details of disk design and operation are effectively hidden from the host computer by the IDE connection. IDE drives can thus break traditional rules and limits with impunity, in order to add storage capacity. Your system never knows the difference. You get the gain without the conventional hard disk pains.

NASCENT STANDARD

An ATA standard has been proposed to the American National Standards Institute (ANSI); as of this writing it has yet to be approved. Formal acceptance and the issuance of an official ANSI number is expected later this year, possibly by the time this story appears in print.

The proposed and currently de facto draft ATA standard was developed by a group called the CAM (Common Access Method) Committee, which was formed in October, 1988, by companies that make and use hard disk drives. The specifications of the ATA interface were first formalized in March, 1989, and the committee hammered out the details in the following months. The final proposed standard was finished and submitted to ANSI at the end of November 1990.

The idea for ATA goes back much further, however. It was originally conceived by Compaq Computer Corp. for use in its now-discontinued Portable II. Work on the new interface started in 1985, the aim being to minimize the number of slots required to integrate a hard drive into the computer. In this first design, the controller was still a separate board, built by Western Digital Corp. to Compaq's specifications.

The term *integrated drive electronics* first appeared in early 1986, when (working with Western Digital and the Magnetic Peripherals division of Control Data

Corp., now part of Seagate) Compaq integrated the WD controller chip onto a CDC half-height 5.25-inch 40MB hard disk drive. In this implementation, the controller was grafted onto the hard disk assembly, but its circuitry was still separate from the rest of the drive's electronics. This drive was first used in the Deskpro 386, in which it connected to a multifunction board in one of the machine's expansion slots. At this time, the specification was first expanded to handle two drives through one connection.

In the middle of 1986, in parallel with the CDC effort, Compaq and Conner start-

IDE drives can break traditional rules and limits with impunity, in order to add storage capacity.

ed a joint development effort to emulate IDE with a gate array that was to be integrated with the rest of the control electronics of the hard disk. A *gate array* is a complex integrated circuit designed for a specific function and made from a large number of logic gates. At this point, the controller became truly integrated, reducing the cost and complexity of the hard disk system while at the same time improving its reliability. The IDE connector was first moved to the system board in Compaq's Portable III.

Of course, once the benefits of the AT-bus connection had been established, other disk makers were quick to follow suit. However, in the absence of an official standard—or even a set of unofficial guidelines—each drive maker added his own nuances and variations to the interface. Consequently, early drives based on the AT interface can suffer compatibility problems, principally if you attempt to connect two drives from different manufacturers to a single IDE connector.

Today, however, though the ATA specification still lacks formal ANSI approval, it does represent a consensus among hard disk manufacturers. Nearly all recent AT-interface drives follow the draft ATA standard, so new AT-interfaced

drives should suffer no such incompatibilities. Even without formal approval, the ATA standard is set, and all hard disk manufacturers follow it in their latest products that use the interface.

SLOT SITTERS

Since the expansion bus is the real AT interface, in its purest form, an ATA drive would most naturally seem to be one you could plug directly into an expansion slot inside your PC. The drive would use exactly the same signals and exactly the same connector as any other expansion board.

In fact, you can do exactly that with Plus Development Corp.'s line of Hardcard disk drives. The original Hardcard might be considered the first IDE product available for personal computers. The drive and controller were integrated as a single plug-in unit. That said, it must also be noted that since none of the Hardcard series follows the proposed ATA standard, none are truly ATA drives in the contemporary meaning of the term.

Contrary to what you'd expect from the name of the interface, a true ATA drive does *not* use a direct connection to the AT expansion bus. Instead, it uses its own signals and connector. Why?

One obvious reason for this is that the expansion buses inside computers are not designed to have cables plugged into them. Their circuitry is not optimized for transmitting signals beyond the backplane of the system board, where signals flow along thin, printed circuit traces. Moreover, you'd hardly want to plug a full-height 5.25-inch hard disk directly into an expansion slot—at least if you wanted to be able to plug any other boards into the bus. The drive is just too big and clumsy.

There are other reasons, as well. You simply don't need all 98 connections of the AT expansion bus to run a hard disk. Hard disk drives are not normally memory-mapped devices, so there's no need to give them control of all 24 addressing lines of the AT bus, for example.

Rather than aim at direct plug compatibility, ATA drives use a special connector on the system board of ATA-compatible PCs. Alternatively, a small host board (it's not a controller card, since the control electronics are on the drive) can be used as an adapter through which you connect an ATA drive to the AT-bus (ISA) or EISA expansion bus. While ATA starts with the AT expansion bus, it modifies it slightly to give it more reach and less complexity.

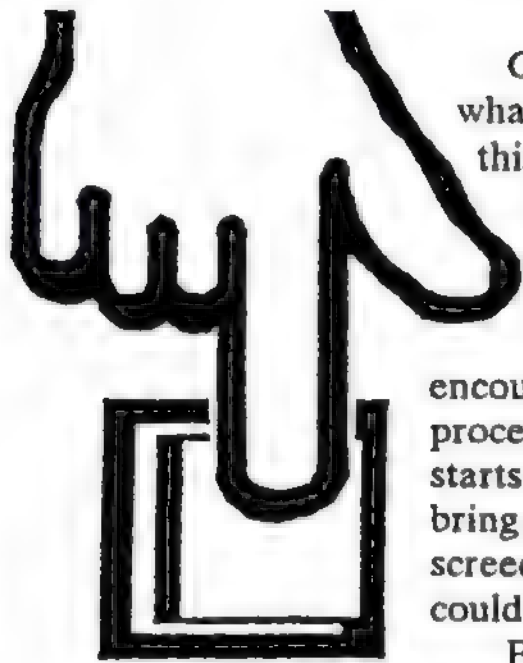
Instead of providing direct access to bus

No other fax/modem can send like this:

To: Helen Lindberg

From: David M. Taylor

2-6-91 7:11pm p. 2 of 2



One step, ten seconds--that's what it took for someone to send this fax using Intel's new SatisFAXtion™ fax/modem.

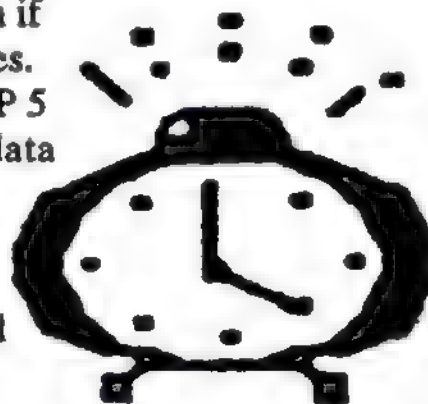
And with other fax/modems? Forget about "one step". Instead, you'll likely encounter all sorts of long, tedious procedures. Worse yet, once a fax starts to go out (or come in), some bring your work on the PC to a screeching halt. Even a one-page fax could tie you up for minutes.

But the SatisFAXtion board lets you fax a document exactly as you'd send it to your own printer. You don't need to leave your application, or mess with a lot of keyboard hocus-pocus.

And because it has a built-in 16MHz, 80186 microprocessor, the SatisFAXtion fax/modem sends and receives completely in the background. You can continue with whatever work you're doing--even if you're sending out a hundred faxes.

There's even a powerful MNP 5 data modem, for fast, error-free data communications.

Now that you know how well the SatisFAXtion board sends, look to the right to learn how well it's been received.



There's plenty more we'd love to tell you about Intel's new SatisFAXtion board: Windows 3.0 compatibility, low memory use, output quality, scanner support, telephone support, and its five-year warranty, for starters. For details, just call (800) 525-3019 and ask us to fax you document #9896. Or call Intel customer service at (800) 538-3373.

intel®

The Computer Inside™

Lab Notes

addressing, the cable going to the hard disk in the ATA design is connected to address-decoding logic circuitry. Only the signals sent to the addresses used in controlling the hard disk are sent to the drive; the address lines themselves become superfluous. The actual addresses used by the ATA connec-

tion are not part of the specification but are determined by the circuitry and BIOS of the host computer.

In addition to address-decoding logic, the ATA design adds buffering circuits that accommodate the length of cable needed to connect the disk drive. These solid-state buffers and line drivers amplify the signal and isolate the source so that changes in the destination do not affect the bus itself. The relatively high speed of the

signals—corresponding to the 8 MHz bus clock of the AT expansion bus—puts a severe constraint on the length of the connecting cable. Specifically, under the ATA proposal, signal cables are limited to 18 inches total length.

Under the proposed ATA specification, the 98 pins spread across two connectors used by the AT bus are reduced to a single 40-pin connector, as shown in Figure 1. Besides the 16 data bits (some implementations may use just 8 bits), provision is made for a variety of control signals. These signals manage the functions of the ATA drive through on-board registers. The control signals include those that request reading or writing data, make DMA transfers, check the results of running diagnostics, and indicate which of the two drives that can be connected to an ATA port is to perform a given function.

The interface also provides a *spindle sync* signal, which allows two drives to spin synchronously as a drive array. A *drive array* is a group of several disks that simulates a single large drive equal in storage capacity to that of the group as a whole. The drives must spin in sync so that the data they receive and deliver is aligned. Each bit must occur at exactly the right time in the data stream.

The 40 ATA connections are made with a pin connector rather than by means of the edge connector used for expansion boards. A pin connector (often called a *header*) comprises two rows of square, gold-plated pins spaced .1-inch apart in both directions.

ATA connectors are keyed to keep you from hooking up the ATA signal cable improperly. That is, of the 40 pins in two rows that make up the host connector, pin 20 is absent (it may literally have been clipped off, for example) and the corresponding hole on the cable connector is plugged. If you try to plug in the connector upside-down (or backwards, depending on your point of view about these things), the plug will hit a pin rather than the pin-20 space it expects, and this prevents you from plugging in the connector.

The ATA scheme simplifies cabling in other ways. All the signals in the cable are extended to each of the two drives that can be attached to a single host connector. Both drives get the same signals on the same pins. No weird twists in the ribbon cable are used to distinguish the drives from one another, as required in IBM's ST506 and ESDI connection arrangements. Instead, the signals to and from in-

3 in 1 **TI 34020, SuperVGA, 8514/A** at 1/3 the price **\$995**

Meet NDI's Volante AT1000, the sizzling new videographics subsystem that delivers:

- the dynamic power of 34020, plus 8514/A and SuperVGA—all on one compact card
 - blazing response times 15 to 50 times faster than 34010 cards
 - instant connectivity to all of your software, including X Windows
 - high-resolution 1024x768 graphics with 256 active colors out of 16.7 million
 - the reliability of NDI's custom ASICs
 - an unprecedented lifetime warranty
- All this. And more. For only \$995.

To learn more about the Volante AT1000 and other 34020-based subsystems, call 1-512-343-5055.



NATIONAL DESIGN, INC.
9171 CAPITAL OF TEXAS HIGHWAY
AUSTIN, TEXAS, 78759

CIRCLE 308 ON READER SERVICE CARD

No other fax/modem can receive like this:

"1990 Award of Excellence...this add-in board
is terrific."

—*Byte magazine*

"Very nice...quick and memory conscious."

—*SatisFAXtion owner*

"Most Valuable New Product of 1990...the board
that finally makes PC faxing as easy and inexpensive
as using a standalone fax machine."

—*PC/Computing magazine*

"Best fax/modem I've used and installed."

—*SatisFAXtion owner*

"Product of the Year for fax boards and fax servers."

—*Systems Integration magazine*

"Excellent product!" "Excellent value!!!"

—*SatisFAXtion owners*

From day one, Intel's new SatisFAXtion fax/modem has received unbridled enthusiasm from PC users and industry experts alike. But there's one more person we'd love to impress—you. To learn a little about SatisFAXtion, just look to the left. To learn a lot, call (800) 525-3019 and ask us to fax you document #9896. Or call Intel customer service at (800) 538-3373.

intel®

The Computer Inside.™

CIRCLE 374 ON READER SERVICE CARD

©1991 Intel Corporation. SatisFAXtion is a trademark of Intel Corporation.

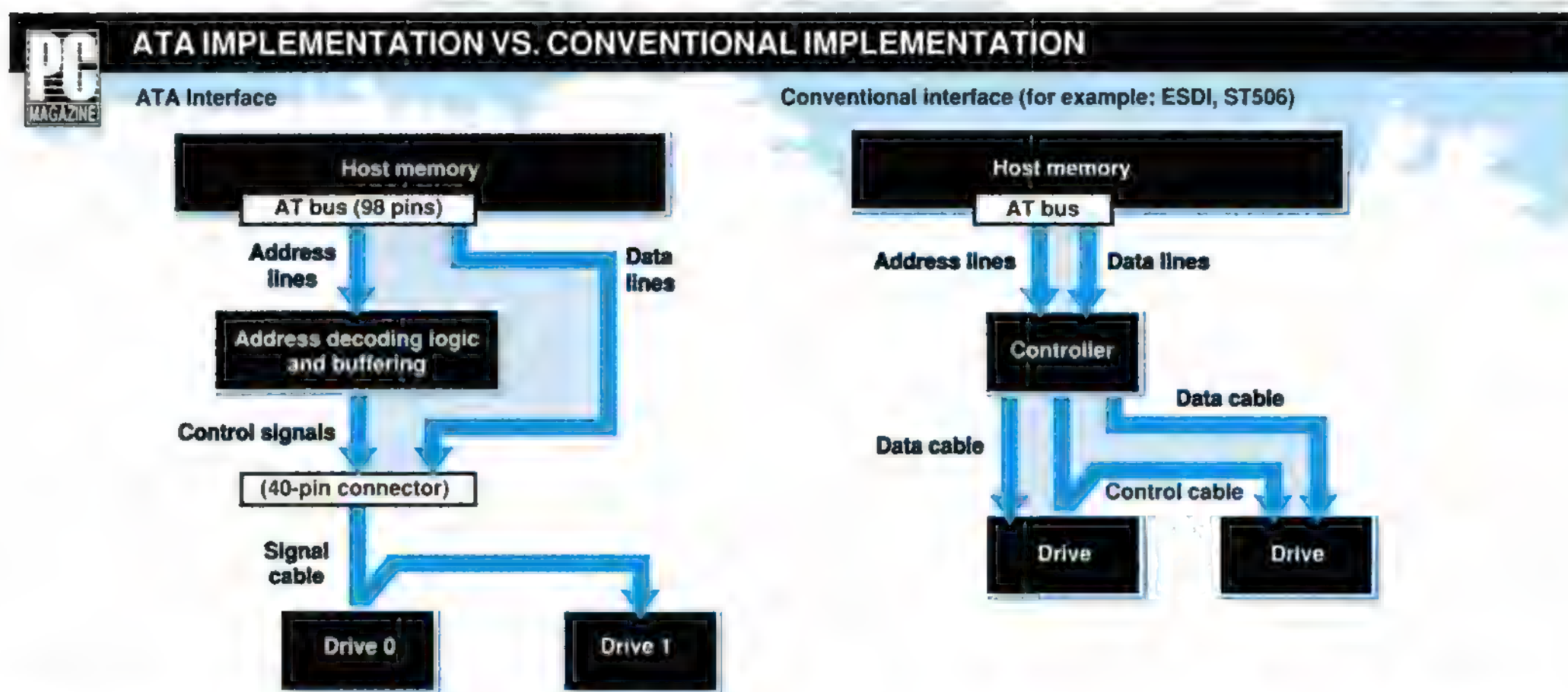


Figure 1: This diagram illustrates some differences between the increasingly popular ATA interfaces and the more conventional hard disk interfaces.

dividual ATA-interface drives are distinguished by control signals and timing.

DRIVE SUPERIORITY

When two disk drives are connected to a single ATA port, one is designated as the *master*, the other is the *slave*. This nomenclature is slightly misleading, however, for the one disk drive does not control the other, and all ATA drives can be connected as either master or slave simply by setting a jumper on the drive itself. The only real difference is that the master drive performs the signal decoding for both units in a two-drive system.

Only one master and one slave are permitted in a single ATA connection, so each of the two drives in a single ATA chain must have its master/slave jumper properly set for the system to work. Most drives are shipped jumpered for operation as the master, so you have only to adjust the second ATA drive when you add it to the short cable chain.

As mentioned earlier, ATA drives do not normally require you to adjust terminations when you install them, as you do with ST506 or ESDI drives. In the ATA design, terminations are unnecessary. Just like plugging expansion cards into an expansion bus, the ATA bus is designed to be properly loaded with any of its possible loads—zero, one, or two drives. Essentially, installing an ATA disk amounts to nothing more than plugging it in.

Of course, when installing an ATA drive, you will also have to attach a power cable. The connectors used for this purpose are generally the same variety to which you've become accustomed when dealing with tape, floppy, and hard disk drives: a nylon four-pin connector keyed to prevent improper insertion. The miniaturized power connector used by some 3.5-inch drive units is also recognized under the proposed ATA standard.

DEMONIC SPEED

Judging performance is at once the most promising, disappointing, and confusing aspect of the ATA interface. In theory, ATA drives can be very fast indeed, outpacing even ESDI hard disks in terms of data transfer rate. As embodied in today's products, however, the ATA connection typically provides little speed advantage over other high-performance interface designs.

The promise of ATA derives from the fact that, as it is based on the AT bus, it should be able to operate at AT-bus speeds. There are no additional limits on the signal flow, such as are imposed by other standard interfaces. For example, ST506 drives force information going to and from the disk to slow down to a maximum data transfer rate of 5 megabits per second, about one-twelfth the potential of the AT bus.

Moreover, ATA is a parallel inter-

face—a full 16-bits wide. Conventional disk interfaces (ST506 with or without RLL data encoding and ESDI) are serial, which means a 1-bit-wide data path. At the same clock speeds, ATA could thus transfer information 16 times as fast as a serially interfaced ESDI drive. (The clock speeds used by the various interface techniques, however, are not the same.)

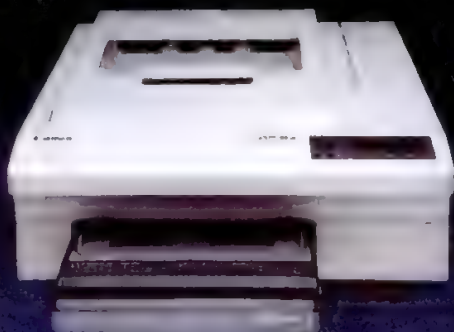
ATA has still another advantage. Conventional designs push the raw data stream from the disk through the interface. This comprises not only data, but disk-formatting information such as sector identifications. The ATA bus, on the other hand, transfers only active data. ATA disks thus get an executive summary of disk-based information; conventional interfaces must include all the footnotes, page numbers, and irrelevant digressions.

In numbers, the ST506 interface imposes a 5-MHz limit (7.5-MHz when using 2,7 run-length-limited data encoding). ESDI drives can go as high as 20 MHz, although many operate at lower speeds—10 MHz or 15 MHz. If all those bits represented only active data, that would set the ST506 limit at a transfer rate of 625K per second (937.5K per second with RLL). ESDI would peg out at 2.5MB per second. A true ATA drive, by contrast could roar along at 8MB per second. (That is, a 16-bit bus operating at 8 MHz with two bus cycles required for each data transfer.)

No existing ATA drive approaches that



Finding the four best
laser printers is easy.
Choosing *which* Canon
to buy is a little tougher.



Come on, now—we can't do *everything* for you. We've produced a complete line of Canon Laser Beam Printers for crisp text and stunning graphics. We've given them features unmatched in their price range—such as built-in scalable typefaces that look great from the finest fine print to poster-sized headlines—with legendary Canon quality.

But we can't tell you that what you need is the compact size (and compact price!) of the 4-page-per-minute LBP®-4. You're the only one who knows how convenient its 14" x 16" size and quiet operation would be on *your* home or office desktop. And how can we even guess what you'd do with the standard video interface for fast, high-resolution applications?

We're not going to insist that you should get the LBP-8 Mark III™ for its 8-ppm speed, or for the ability to boost its standard 1.5MB all the way to 4.5MB. Sure, it can accept our IC cards for additional typefaces and capabilities, but so can the others.

Maybe you never need to print letterhead plus second sheets, or long unattended jobs. So why should we brag about the Mark III T™ with dual paper cassettes that can hold up to 400 sheets? Just because it can combine portrait and landscape text? Big deal—that's standard for Canon Laser Beam Printers.

And unless you want the ultimate in capability and convenience, you'd have no interest in the Mark III R™ with dual cassettes and duplex printing for newsletters, and lengthy reports. Even though, like the others (yawn), it supports all popular word-processing and DTP software.

Visit your Canon dealer—call us toll free at 1 (800) 848-4123 for the one nearest you. We've done our part, with four Canon Laser Beam Printers that set a new standard.

But the hard part is up to you.

Genuine Adobe® PostScript® is now available for the LBP-4 and the LBP-8 Mark III Series printers.



A printer driver kit is provided free with each printer containing all printer definition files currently available on diskette, plus complete installation instructions.

Canon is now available on CompuServe.™ Type Go Canon at any "!" prompt to access the Canon Forum.

Canon
LASER BEAM PRINTERS

Working To Improve Your Image.™

From Top To Bottom: LBP-4, LBP-8 Mark III, LBP-8 Mark III T, LBP-8 Mark III R. Canon® and LBP® are registered trademarks and Mark III, Mark III T and Mark III R are trademarks of Canon Inc. • Adobe® PostScript® and the PostScript logo are registered trademarks of Adobe Systems Inc. in the U.S.A. • CompuServe® is a registered trademark of CompuServe Inc.

CIRCLE 187 ON READER SERVICE CARD

Lab Notes

speed, however. One reason is simply that ATA is too new. Instead of developing brand new ATA drives, most hard disk manufacturers have understandably begun by reworking existing hard disk mechanisms and attaching ATA electronics to their old assemblies to create ATA drives.

The chief speed-determining factor for hard disk transfer rates is the reading speed of the disk head. This, in turn, is determined by the density of data on a track and the speed at which the track spins under the read/write head. Because ATA drives have generally retained the same spin rate and data density as ST506 and ESDI drives, they pull information from their platters at the same rate as those more conventional products. Thus the best of today's ATA drives are able to extract data from disks at a rate of only 1.5- to 2.0MB per second—about the same as the actual throughput of top-of-the-line ESDI drives.

When you read the specifications, however, you'll find that most ATA drives are rated at much higher transfer rates. The reason is that the figures report how quickly the drive can move information through the AT bus. They assume that the drive can transfer the data instantly from the disk platters into the ATA electronics. ATA hard disks could approach this speed only if the drives use a large on-board buffer and that buffer is full of the data requested from the computer host. The buffer isolates the data request from the mechanical delays imposed by the actual drive.

Since a typical ATA drive does in fact have a 32K to 64K buffer, you might expect to gain some performance benefit from the higher transfer rate of the ATA bus connection. Unfortunately, however, in most cases the on-disk buffer is just a holding zone, not a real cache with memory management. A true cache can anticipate the information your system will next request; a buffer merely reads blindly along. Consequently, the buffering does not appreciably increase the actual throughput of the drive. It offers little benefit when disk sectors are accessed randomly. True disk caching, by contrast, could accelerate random accesses tremendously.

Once its on-board buffer is drained, ATA disk performance falls to the level of the internal (disk to electronics) transfer rate. So when you make a request to read

or write a large file (a full-page graphics image, for example) all the data will have to be freshly read from the drive, and the actual throughput will be the internal transfer rate rather than the interface rate.

Nothing prevents a hard disk manufacturer from actually putting a true cache on an ATA drive, of course, and the ATA interface has become sufficiently widespread to be seen by some controller manufacturers as just another interface that can be adapted to computer systems. One such manufacturer, Perceptive Solutions Inc. (PSI), has developed a cached ATA host

**The real benefit of
integrating drive and
controller is the
freedom it affords the
disk designer.**

adapter that can manage up to 16MB of on-board memory. Although there's as yet no particular benefit to an ATA drive with a large cache, compared with an ESDI drive with a similar-size cache, there's no disadvantage either. The PSI controller yields a workable high-performance system that gives access to a wider variety of hard disks.

It is also possible to get at the real bottleneck by increasing the internal transfer rate of ATA systems. Most hard disk manufacturers have begun to use new technologies that do exactly that. For the most part, however, their objective has been to increase capacity rather than performance.

MORE BYTES, LESS SPACE

Because all the essential circuitry of the hard disk controller is built into an IDE drive, you don't need to carefully match an ATA hard disk to a controller to get a working system. You don't have to worry whether a particular drive can handle RLL data encoding or what its ESDI transfer rate may be. The manufacturer has already done that for you.

Building user gratitude for such convenience is not the chief reason for integrating drive and controller, however. As mentioned earlier, the real benefit of the combination is the freedom it affords the

disk designer. Since he is not held back by the technology of existing controllers he can create and optimize an entire drive-and-controller *system* for whatever parameters he feels are the most important.

For example, to pack data more tightly, he might choose 1,7 RLL or another group-recording data format. He then will select a disk medium that will handle the flux densities required by that coding method and drive electronics capable of handling its higher frequencies.

The disk designer is also freed from other traditional constraints. Most conventional hard disks rotate at a constant number of revolutions per minute. In consequence, they store data less densely in their outer tracks, where flux transitions are spread farther apart. IDE drive designers, on the other hand, can use *zone-bit recording*, which involves writing to different zones of the disk at different rotational frequencies so as to maintain a nearly constant data density across the disk. Using higher frequencies at the outer tracks of a disk increases their data density to that of the inner tracks, which can substantially increase overall disk capacity, without compromising reliability.

The embedded disk controller in a zone-bit recording system must mask the actual physical characteristics of the drive so that it looks to your PC as if it has a standard geometry, such as tracks of 17 sectors, with each sector storing 512 data bytes. DOS can't deal with disks that magically change from having 17 sectors per track one minute to 23 sectors, then to 31.

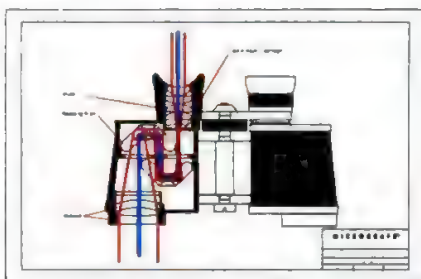
Besides being necessary for zone-bit recording, masking the physical disk structure can provide other benefits. For example, it can make otherwise-incompatible drives function in PCs. While neither DOS nor most BIOSs allows the use of more than 1,024 tracks (or cylinders) on a hard disk, an IDE drive can mask the number of tracks it actually has. The logical geometry of the disk need bear but scant resemblance to its physical geometry. An IDE drive with 2,048 tracks and two heads could be mapped to look like a four-head, 1,024-track drive to match up with DOS.

Most ATA disk drive manufacturers now go even a step further. Not only do they mask the physical characteristics of their products, they also add enough intelligence to the disk drive so that it can sense what parameters (the number of heads, cylinders, and sectors) your PC expects and then automatically match those parameters. In the ATA specification, this fea-

Focus on Precision Illustration With New Designer 3.1

New!
3.1 Release
Free Trial Software

See for yourself. New Designer 3.1 turns your PC into a precision illustration tool, running under the Microsoft® Windows™ environment. You'll get more accuracy in technical illustrations, greater performance in graphic designs and higher speed in desktop publishing layouts. It's now easier to turn what you can imagine into an image all can see. Call for your free trial software and feel the high performance yourself.

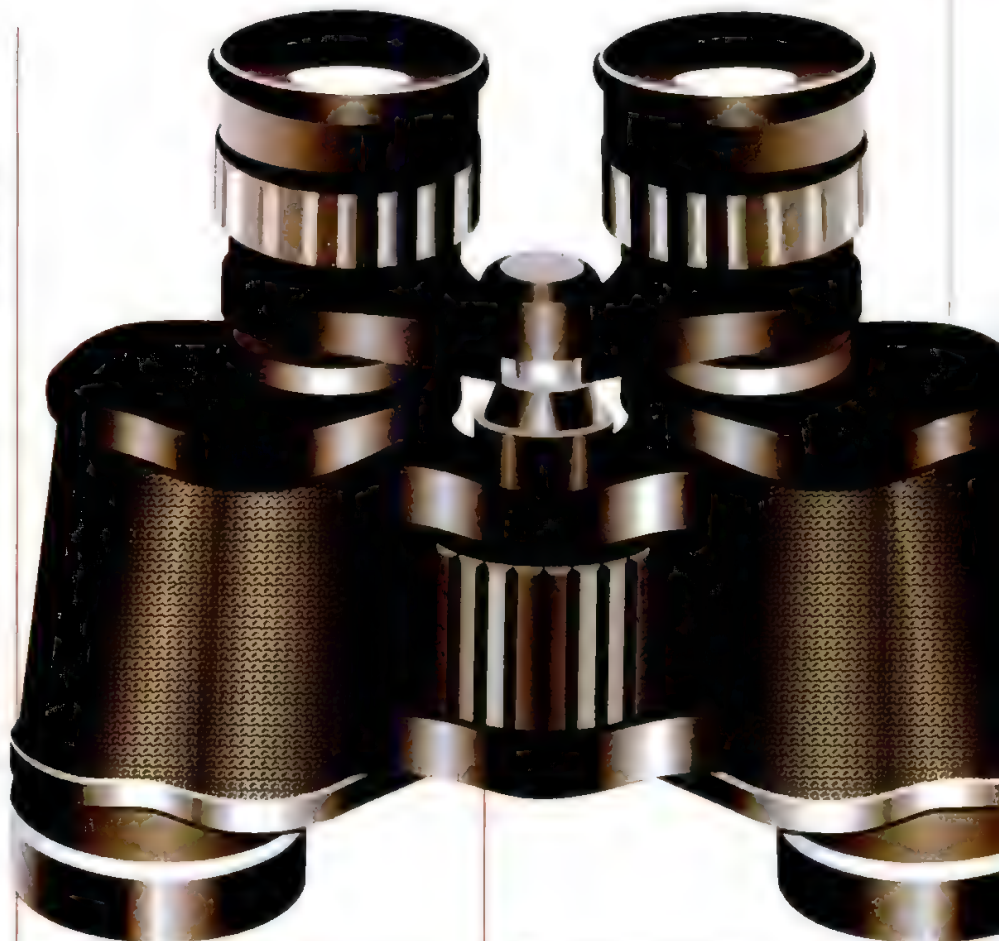


- ▲ Higher performance in Designer 3.1 speeds up drawings with faster wide styled lines—even wide dashed lines. Object snap points make precision a given.

The view from out front. With new Designer 3.1 you're ahead of the pack no matter how you look at it. With more usable features, higher performance operation and more flexible file handling, you'll be able to create and manipulate an image until it's just right. That's precision.

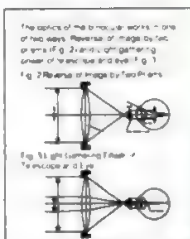


- ▲ Choose from 16.4 million colors and save any number of custom palettes for later use. Combine text and graphics with bitmapped images and true layering.



- ▲ "The power-users choice . . . a customizable toolbox has a tool for just about anything; precise and accurate autotracing utility, CAD-like layering and superb color-publishing capabilities," says PC Magazine.

- ▲ Desktop published articles become clearer with precision illustration from Designer 3.1. Multiple file formats speed up import and export of files.



Outside perspective reflects well.

PC "Designer is an outstanding illustration package that receives Editor's Choice recognition. Designer is perhaps the most sophisticated of all the illustration packages," writes PC Magazine.

Software Digest reports that "Designer provides the best overall graphics package. The program offers state-of-the-art features, good performance, and unmatched ease of learning and use in a sophisticated package. Designer can handle virtually any free-form graphics or design task with ease." Designer was awarded a top-of-the-class rating.



Free hands-on trial. Call now, for a free working model of the new Designer, 800-733-3729, ext. 5050.

From the "Big Guns" in High Performance Graphics.



High caliber V.42bis modems with the biggest bang for the fewest bucks.

Why pay a premium price for V.42bis modems from the big shots? Or take a shot in the dark on a no-name? The AT[®] family of modems offers the double-barreled advantages of sophisticated error correction and data compression for hundreds less than the competition.

Lowering the price of high performance.

Developing innovative custom electronics has made us a world leader in video graphics technology. Today, AT[®] is applying that expertise to design and manufacture high performance modems offering all the latest advancements and capabilities for less money.

9600 velocity from a 2400 modem.

Our 2400etc/e* external and internal modems are the lowest priced V.42bis modems on the market. Yet they're loaded with fire power. Like high velocity V.42bis and MNP5* data compression for transmission speeds up to 9600 bps.

Advanced V.42 and MNP error correction for 100% error-free data transfer.

Complete compatibility with the Hayes* AT command set. Plus, the 2400etc/e external offers synchronous capabilities, along with the convenience of easy-set front panel controls. All for under \$300**.

Our biggest bang.

For an even bigger blast of speed and performance, take aim at our 9600etc/e*. It combines the industry standard V.32 protocol with V.42bis data compression to simultaneously transmit and receive data up to 16 times faster than 2400 bps modems. Think of how much that can save on transmission costs. Plus our easy-set front panel controls make changing settings a snap. And the 9600etc/e is priced under \$700 **... what some others charge for their 2400 bps modem.

See us at Booth 1885
A/E/C SYSTEMS '91
May 8-10 Washington, DC

See us at
WINDOWS WORLD '91
The Official Conference and Exposition for Windows Computing

Booth 2544 May 25-27, 1991 Atlanta, Georgia
**CIRCLE 337 ON
READER SERVICE CARD**

AT[®] Technologies Inc.
3761 Victoria Park Avenue
Scarborough, Ontario
Canada M1W 3S2
Tel: (416) 756-0718
Fax: (416) 756-0720


ATI
TECHNOLOGIES INC.
Technology you can Trust.

ATI's Family of Products includes: 8514/ULTRA • VGAWONDER+ • VGA EDGE-16 • VGA BASIC-16

Copyright © 1990 AT[®] Technologies Inc. *Trademarks are registered by their respective companies. **Suggested retail prices. Dealer may sell for less.

Lab Notes

ture is called *translation mode*.

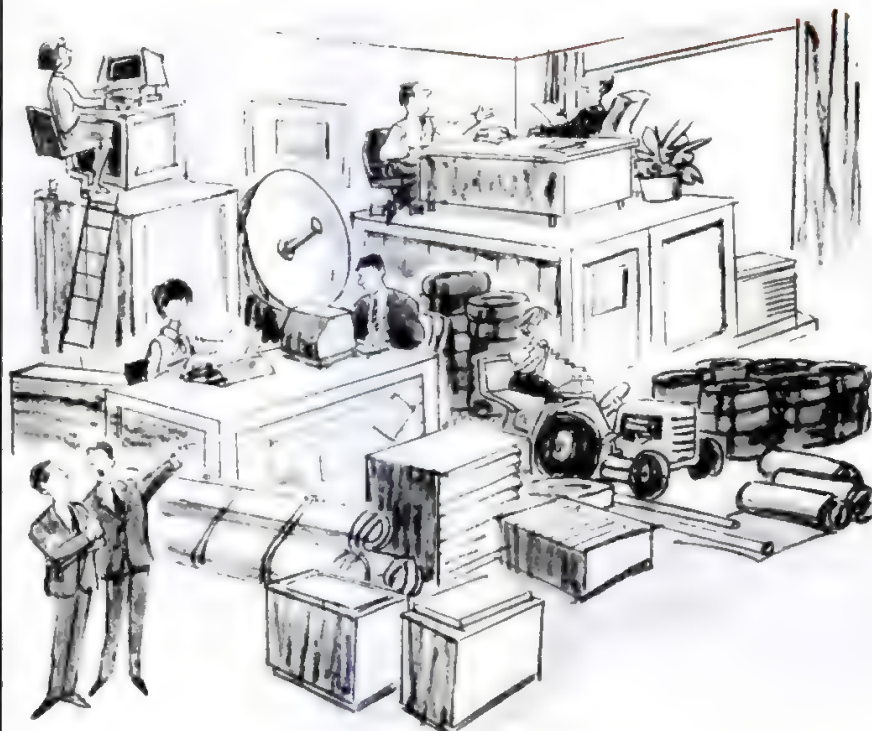
An ATA drive that supports translation mode will accept any drive parameters you choose with your PC's setup procedure, providing you don't specify more capacity than the drive is capable of supplying. For example, you could buy an 80MB ATA drive that supports translation mode, and it will automatically adapt to emulate whatever number of heads and cylinders you already entered into your setup program.

Translation mode does have one drawback, however. Once you format a drive using a given head and cylinder emulation, its logical configuration is set and cannot be changed without reformatting the drive. The drive can still automatically adapt, but your data cannot.

A potential problem arises when the CMOS (complementary metal oxide semiconductor) configuration memory of your PC becomes corrupted. For example, if you have to replace the battery in your PC and reconfigure your system, you must remember the drive parameters you had set in order to recover the data you stored. Similarly, if you want to transfer a drive and its data between different systems, you must use the same setup parameters in each system. Write this information down, or better yet print it on a label and affix it to the drive so that you won't forget or lose it; the translation-mode drive itself will offer no help beyond telling you its capacity.

The only current drive interface that can match all the benefits of ATA is another IDE-based system, SCSI. SCSI and the new SCSI-2 connection schemes promise all the benefits of extra capacity and reliability of ATA, along with even greater performance.

SCSI, however, is a general-purpose interface, designed to accommodate a variety of computer designs (it's particularly favored for Macintoshes and workstations) and system peripherals—tape drives and scanners as well as hard disks. ATA concentrates on doing one thing well, and offers a much simpler means of connecting hard disk drives in a way that is tailored exactly to PCs. Either way, an IDE interface will likely be what pulls your next PC's hard disk up the performance slopes that lie ahead. ■



*"Do you really want to make Vice President, Fenton?
Get rid of this excess inventory...pronto."*

CALL EAL IF YOUR CORPORATION HAS MATERIAL AVAILABLE FOR DONATION.

EAL - Will take your donated material and use it to generate scholarships for needy, deserving students.

EAL - Donations could mean an above cost tax deduction - IRS Reg.170(E)(3)

EAL - Scholarships are given in the donating corporation's name.

EAL - Leverages your gift to help participating colleges.



EAL

For More Details
Call 708-690-0010
Peter Roskam



Backup all this data in 6 minutes without lifting a floppy.

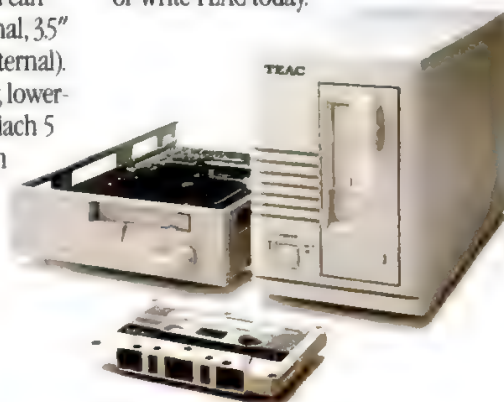
If you think backing up the data in all these books in just a tick over 6 minutes is pretty nifty, imagine backing up a hefty 100MBs in less than 15 minutes. That's a rate of 7MB/min.

Introducing the 160MB TurboTape™ Data Cassette Backup System by TEAC. It's also a way to reliably retrieve a ton of data in minutes. With unflinching accuracy. Without having to insert and eject an endless number of floppy disks.

For high-speed, high-capacity data cassette backup 366 days a year, you can choose the TurboTape Mach 7 (internal, 3.5" or 5.25" form factor) or Mach 7X (external). For large-reliability, smaller-capacity, lower-speed needs, there's the TurboTape Mach 5 which will transfer 60MBs of data in only 12 minutes.

Each system comes complete with hardware, software, interface cables and documentation.

For more about TurboTape, ASAP, call or write TEAC today.



TURBOTAPE

by
Richard Hale Shaw

Utilities

You come in at 8:00 A.M. to finish up the work that kept you late into the night. You start *Microsoft Windows 3.0*, the Program Manager appears, and you encounter your first problem; trying to remember what combination of applications and utilities you were using just before calling it a day. Then, of course, you must reopen all those programs and either position and size their windows or minimize them to get them out of the way.

Don't you think *Windows* should be able to restore your previous setup? Many users mistakenly assume that's just the purpose of the Save Changes check box displayed at shutdown. Unfortunately, however, when you select Save Changes, the only changes saved are those you've made to the arrangement of the windows or icons in the Program Manager's workspace.

What you really need in times like these is WINSaver. WINSaver is a *Windows 3.0* utility that remembers both the names of the programs running when you exit *Windows* and the arrangement of their windows and icons. When you next bring up *Windows*, WINSaver restarts all of these programs and restores and arranges their windows, even minimizing them to icons, as appropriate.

The only thing that WINSaver can't save is the *state* of your programs. For example, if you are running *Windows Write* when you shut down, WINSaver will not save the name of the file that *Write* had open. The reason this feature isn't in WINSaver is this: Some *Windows* programs will accept the name of a file to open as a command line argument, but that convention isn't followed by every *Windows* program. Furthermore, difficulties would arise if a program expected options on the command line and got a filename instead. If all programs saved their state information in WIN.INI or in a private initialization file, WINSaver could have done the whole job on its own. Still, the amount of manual intervention required to restart your session is minimal.

Restore Your Windows 3.0 Sessions With WINSaver.EXE

■ Now you can save and automatically restart and reposition all the applications and utilities you used in your last *Windows 3.0* session.

GETTING AND USING WINSaver

As with all of our utilities, the easiest way to obtain a ready-to-run copy of WINSaver.EXE is to download it from PC MagNet (search for WINSAV.EXE). Directions for downloading files are given in the PC MagNet News page immediately following this column. If your modem setup can't handle binary files directly, you can download WINSaver.BAS instead; running this file in BASIC will create WINSaver.EXE on your disk. In case you wish to modify and then compile the program yourself, the C source code is also available from PC MagNet. If you don't have the means of downloading any files, we can fax or mail you the source code listings. Simply send a *postcard* with your name, address, and fax number (if applicable) to Katherine West, Utilities, *PC Magazine*, One Park Avenue, New York, NY 10016.

Installing WINSaver is easy: Just copy it to your hard disk and load it from the *Windows 3.0* Program Manager. As an alternative, you can start it with *Windows* from the DOS prompt by entering

WIN WINSaver

Once *Windows* is running and WINSaver is loaded, the WINSaver icon will appear at the bottom of the screen. If you click on the icon, you'll find that three options—About . . ., Autosave, and Autoload—have been added to WINSaver's System menu. I put the usual About box entry here because WINSaver has no need for the conventional window with an Action bar menu. Both Autosave and Autoload are toggled options; when you click them on, a check indicates that they are active. The WINSaver menu is shown in Figure 1.

If you check the Autoload option, WINSaver will automatically install itself in the *Windows* initialization file by adding itself to the LOAD= entry of the [windows] section of WIN.INI. Thus, after you activate the Autoload, *Windows* will automatically load WINSaver for you and you'll never have to run it manually again. If you toggle Autoload off, WINSaver will be removed from the LOAD= line.

The Autosave option controls whether or not WINSaver prompts you to save your session when you shut down *Windows*. When that option is checked, WINSaver adds

Autosave=1

to WINSaver's section of WIN.INI. WINSaver creates this section for you. If you keep this option checked, WINSaver will automatically save the names of your programs as well as their window positions and sizes to WIN.INI without further prompting when you shut down

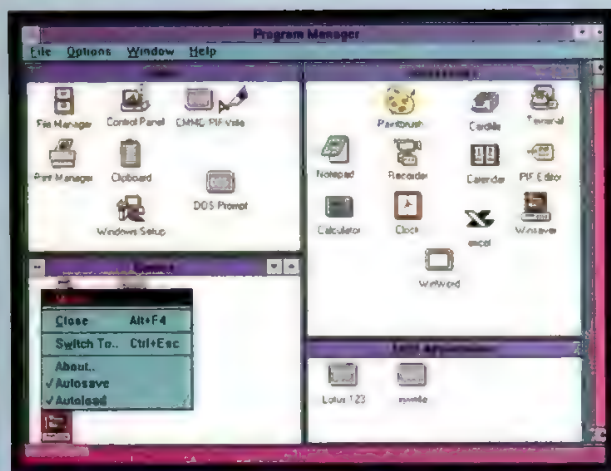


Figure 1: WINSAVER remembers the names of loaded programs and saves the arrangement of their windows and icons. When checked, the Autoload option ensures that WINSAVER loads at Windows start-up. Autosave lets you save sessions without responding to a prompt.

Windows. If, on the other hand, you don't check Autosave, each time you exit *Windows* WINSAVER will ask you whether you want to save the session.

To try out WINSAVER, run it and check both Autoload and Autosave on the System menu. Then open up some *Windows* 3.0 applications, minimizing some and putting the windows of others into unusual sizes and positions. Then exit *Windows* and restart it. When you restart *Windows*, the Program Manager (or its icon) will appear, followed by WINSAVER's icon. A few moments will elapse while the programs are loading, then—voilà!—the screen will appear with the programs and icons in the exact same sizes and positions as before.

HOW WINSAVER GETS ITS DATA

WINSAVER does not do anything until you quit from *Windows*. When you select File Exit Windows in the Program Manager, or select Close from the Program Manager's system icon, or double-click the system icon, the Program Manager displays the familiar Exit Windows dialog box. If you respond with an OK, *Windows* posts a message to all the top-level windows—the main window for each application—in the window manager's internal program list.

Internally, the WM_QUERYENDSESSION message posted by *Windows* is the initial notification that *Windows* is shutting down. Upon receiving this message, an application should prompt the user to save any open files. If the application is unable to comply, it should reply

with a zero value, on receipt of which *Windows* aborts the shutdown sequence. If all of the applications reply to the WM_QUERYENDSESSION message with nonzero values, however, *Windows* posts a WM_ENDSESSION message to the applications. WM_ENDSESSION is the notification that shutdown is imminent. At that point it is too late to save any files.

It is from the window manager's list that WINSAVER learns which windows are open, as well as what their exact positions and sizes are. Each window is represented in the list by its window handle—the integer value that *Windows* programmers routinely use to reference a window. Once the window handle has been retrieved, WINSAVER can use it to retrieve the name of the executable program that created the window.

When WINSAVER receives a WM_QUERYENDSESSION message, it uses its GetWindowList function to build its own list of the windows that are open and applications that are running. GetWindowList does this by calling the GetWindow and GetNextWindow API functions to retrieve the first and subsequent handles of each window in the window manager's list. Each window handle is then used to retrieve a handle to the program that created the window and, in turn, the name of the program. Each window handle and program name is stored in a structure. WINSAVER maintains an array of structures sufficient to store information for up to 256 windows.

Once WINSAVER has retrieved the

window handle and program name for each window, it calls SaveSession. This function removes any existing settings for WINSAVER in the WIN.INI file and writes out a new section (including the settings for Autoload and Autosave). It then writes an entry in WIN.INI for each window in its list. These entries are numbered and appear as Win0=, Win1=, Win2=, and so on. Together with each entry is the name of the executable program for that window, a value designating whether the window is Iconic, Normal, or Maximized, and the dimensions of the window. These values are obtained via the *Windows* API functions IsIconic, IsZoomed, and GetWindowRect.

You should note that WINSAVER doesn't save the window information for every window in the window manager's list: It specifically omits windows of PROGMAN.EXE and USER.EXE. The former is, of course, the Program Manager; the latter is one of the *Windows* Dynamic Link Libraries. USER.EXE usually has a number of hidden windows open at any time, but these are not pertinent to WINSAVER's operations. Once WINSAVER returns from SaveSession, it returns a nonzero value to *Windows*, indicating that it is okay for *Windows* to terminate.

ADVANCED USE AND ANOMALIES

When you start using WINSAVER regularly, you'll find that it's more than just a useful way to save and restore your *Windows* desktop from session to session. Since WINSAVER always restarts the applications you're running at the end of a *Windows* session, you can use it to achieve the same result that would otherwise require editing your WIN.INI file's LOAD= and RUN= statements. Thus, if there is a program that you always want to have running when you bring up *Windows*, simply leave it running whenever you exit *Windows*. As long as WINSAVER is loaded and Autosave is checked, the program will restart the next time you bring up *Windows*, and it will continue to do so as long as you continue to let it run when you exit subsequent *Windows* sessions.

There are a few applications that do not follow the usual *Windows* conventions, so they require special handling if they are to come up when you use WINSAVER. Pioneer Software's *Q + E*, for example, closes its files and terminates when it receives a WM_QUERYENDSESSION message rather than waiting for a WM_ENDSESSION message. Thus, if *Q*

Utilities

+ E is further up in the window manager's internal program list than WINSaver is, WINSaver won't know that Q + E was among the programs you want saved.

If you find this happening with Q + E or any other *Windows* 3.0 application, simply click on the WINSaver icon before you tell the Program Manager to terminate *Windows*. This will put WINSaver at the top of the window manager's list and allow WINSaver to read the list and save each application's window information before the aberrant program has a chance to terminate.

You may find a minor conflict between WINSaver and replacements for the *Windows* Task Manager such as the *Threadz Task Manager*. For some reason, the *Threadz Task Manager* doesn't like to be loaded by any program other than *Windows* itself—and that includes WINSaver. Fortunately, this problem can be overcome by installing the *Threadz Task Manager* as a LOAD= entry in WIN.INI. This enables you to avoid the conflict, because WINSaver does not rerun programs that have already been loaded by *Windows* via WIN.INI.

Finally, when WINSaver starts an application, the application's window may flash on the screen in a position and size other than what you expect. If this happens, it's probably because the application is ignoring a parameter passed to it by *Windows*.

Via the WinMain function in every *Windows* program, a *Windows* application receives several pieces of information, including an instance handle, a pointer to the command line, and a value that tells it how to display itself. The application typically passes the latter, nCmdShow, to the ShowWindow function when it's ready to display itself for the first time. Via this parameter, WINSaver passes an SW_HIDE, which tells the application to open itself invisibly. There's no guarantee, however, that the application will use this parameter: it can just as easily call ShowWindow with another value like SW_SHOWNORMAL which in turn displays the opened window. Some versions of *Ami Professional* will do this.

RESTORING WINDOWS ARRANGEMENT

Subject to the settings for Autoload and Autosave, WINSaver uses the entries it

has made in WIN.INI to restore the *Windows* desktop when you restart *Windows*. It reads each window entry, beginning with Win0=, and refills the structure. It also compares the name of each executable program with those found in the LOAD= and RUN= entries in the [windows] section of WIN.INI. This way, WINSaver knows not to try to restart an already loaded program. Note that WINSaver performs this elimination when restoring the window arrangement, not when it saves the list; after all, you might have edited WIN.INI before you restarted *Windows*.

After building its list from WIN.INI, WINSaver is now ready to run each of the programs. Using the WinExec API function, WINSaver invisibly starts each program and then retrieves its win-

When you start using
WINSaver regularly,
you'll find that it's
more than just a useful
way to save and restore
your *Windows* desktop.

dow handle via another API function called GetWindowHandle. Finally, the utility swings through the list again, this time to position and size each window. WINSaver uses the ShowWindow API function to display the previously hidden windows. This procedure introduces a slight delay between the appearance of WINSaver's icon and those of the other programs, but when the other programs appear they do it simultaneously and WINSaver's task is finished.

LEARNING FROM WINSaver

PC Magazine utilities' authors usually learn a great deal more than they expected to learn in the process of creating a utility, and writing WINSaver was no exception. It provided a number of subtle reminders that *Windows* itself is far from perfect.

I've already mentioned that the Save Changes box really should have made WINSaver unnecessary. What's more,

in one test, I found that the Program Manager consistently appeared in iconic form—regardless of whether WINSaver or other programs were installed. In addition, I found that the Program Manager can easily get confused if you've placed a lot of program groups and icons in it.

In my own setup, for example, I have some 15 different program groups, with a total of 150 different program icons. (The largest single program group has 25 program icons.) While I haven't determined the exact threshold, I did find that after I added enough groups, icons, or both, the Program Manager began behaving erratically. Specifically, the result is that most of the time when I start *Windows*, the Program Manager jumbles up the icons in its top-level program window. I have to use *Windows* Arrange Icons to reorder them, and the next time I run *Windows* they're jumbled again.

Moreover, assuming that your Program Manager windows have a white background, you'll see some strange behavior if you open a DOS window that overlaps the Program Manager. Just click on one of the Program Manager's program icons so that it overlaps the DOS window, then click on the DOS window again. If you now click on a different Program Manager program icon, the area where the DOS window overlapped the Program Manager will be filled in with the Program Manager's background color.

Finally, *Windows* reserves only one block of memory, up to 64K in size, to store information on all icons and windows. This space is what *Windows* refers to as system resources in the Program Manager's About box. Every time you add a program icon or group icon to the Program Manager (or to other groups), it comes out of this space. If you don't believe me, try adding a number of new groups and program icons to the Program Manager. Then, observe the free system resources percentage in the Program Manager's About box after you add each one.

Surely, of all applications, the Program Manager should not be saddled with this 64K limit. With any luck, this may be fixed in a subsequent *Windows* release, but until then, the next time you get a message telling you to free your system resources, consider deleting some Program Manager groups or program icons. It'll make a significant difference. ■

Richard Hale Shaw is a contributing editor of PC Magazine.

Uncle Sam Says

WE BUY SAFETY, EXPERIENCED SUPPORT AND SOUNDNESS.

You too can enjoy the same proven safety. Over the past ten years more than 700 of my agencies and their contractors bought computers from Iverson, because of their experienced support and soundness.



Committed!

Iverson is committed to delivering total quality.

Total Quality Control means incoming, in line, test and burn in, cosmetic, packaging, and shipping inspection. Furthermore, individual custom foam packing of each system insures safest shipping.



Supportive!

Iverson offers full integration services.

- Design and Install LANS
- Custom Hardware
- World-wide installation & Training
- Software loaded at plant
- Custom application software and printer drivers

Established!

Iverson has invested in the plant and staff resources to stand behind your IBM® PS/2® purchase.

Iverson operates two huge classified systems integration contracts nationwide, over \$15 million a year for each

Iverson customizes and manufactures computers in the firm's own 48,000-square-foot plant in Clearwater, Florida.

Iverson operates its own full service FCC laboratory at the Florida plant.

**Nationwide
Training in
home/office.
Start-up
course,
only \$99.**

Responsive!

Iverson understands the support you need and is committed to providing it.

For only \$99, we will send our technician/trainer to your home or office to provide 90 minutes of instruction for up to four people. This service is available in most cities nationwide.



Experienced technical support or on-site service is only a phone call away. Iverson support includes 24-hour toll-free technical and service support hotlines. Our 7000-square-foot repair depot supports ten Iverson field service offices and 150 TRW service offices in the U.S. and 100 in Canada with over 4,500 different parts.



IBM and PS/2 are registered trademarks of International Business Machines Corporation

Traded on American Stock Exchange (IVT)

IVERSON TECH



MOST IBM[®] SYSTEMS

- TEMPEST
- Removable Drives
- Ruggedized
- Custom Applications

Over 700 customers world-wide have benefited from ITC's customization of IBM products. From laptops to desktops, micros to mid-range processors, International Technology has an IBM-based solution for your special computing needs. So why risk your critical application on anything less than IBM quality and reliability.

- Specializing in re-engineering of 9370 (9332) DASD to provide removability.

Model 50Z with Removable Hard Disk

Over 500 shipped to date

- Additional customizing and quick delivery.
- Rack mounted PS/2 Model 70s, ruggedized for protection against Vibration, Shock, High and Low Temperatures, Humidity and Dust per MIL-STD-810D, methods 501.2, 502.2, 510.2 and DTB ISL-89-0896.

GSA Contract #: GSOOK90AGS5276

CALL 1-800-388-GSA1

**EXPERIENCED
SUPPORT
FINANCIAL
STRENGTH**

**SINCE
1978
CURRENT
ASSETS
(9/30/90)
\$17 million**

**P.O. Box 6250 • 1356 Beverly Road
McLean, Virginia, 22106-6250**

INT'L TECHNOLOGY CORP

A Subsidiary of

IVERSON TECH

CIRCLE 480 ON READER SERVICE CARD



PC MagNet News

The Latest Files and Features of PC Magazine's On-line Service

Customize Windows 3.0 Wallpaper

One of the things people like about *Microsoft Windows* is that you can import, edit, or even create your own personalized wallpaper to display behind applications. *Windows 3.0* wallpaper is stored in a new .BMP (bitmapped) format that differs from traditional .GIF graphics picture screens. Luckily, .GIF can be customized over to .BMP format with a little help from some friends.

One of these friends is the useful WINGIF.ZIP. This \$15 shareware program, by Kyle Powell of SuperSet Software Corp., allows you to copy your favorite images to .BMP format for use as wallpaper. Editing, resizing, dithering, and more are all creatively simple.

Another friend is *PaintShop* (PS.ZIP), Version 1.20, a \$25 shareware program by Robert Voit. This will also allow you to display, alter, and save picture files using .BMP, .GIF, .IMG, .PCX, and .RLE file formats. Operations involving .GIF file loading and saving or dithering of any picture are done in the background.

Both programs are in DL10 of our UtilForum (GO PCM:UTILFORUM).

Joe Salemi: Programming's Workhorse

Joe Salemi started playing with microcomputers in 1980, when he first sat down at the brand-new Apple II Plus in a public library. In eleven years,

his characteristic hard work and careful insight have transformed Joe into a specialized authority on database systems, LANs, communications, and PC operating systems.

Besides being the Wizop of the PC Week Forum (GO PCWEEK) and of his own Fidonet-based BBS, he is a frequent contributor to *PC Magazine*. Starting with this issue he takes over the responsibility for the Advisor column.

Early in 1989, Joe became the primary sysop of the PC MagNet Programming Forum (GO PCM:PROGRAM), where he continues to provoke and monitor intelligent discussions with our users and with contributing editors Petzold, Duncan, and Boling, among others.

Believe it or not, Joe has time to hold the position of manager of a large LAN project at the National Cancer Institute. Stop by Programming Forum to get tips, discuss topics, and ask Joe when he finds time to sleep!

Babble On!

Babble is an ASP shareware amusement (\$25) for people who claim a distinct affinity for the English language. This scrolling text diversion provides unending conversation, prolific prose, and great fun for those who enjoyed long-winded college professors! Samples ranging from Shakespeare and Firesign Theatre to your own text can clutter this wonderfully funny but useful program. It is made available in DL8 of UtilForum (BAB200.ZIP) by ASP members Korenthal Associates. —by Chris Parker

- **INTERIOR DECOR:** Customize *Windows 3.0* wallpaper with *WinGif* and *PaintShop*.
- **JOE SALEMI:** Super sysop of PC MagNet's Programming Forum.
- **BABBLE:** Hilarious wordplay from ASP shareware.

Instant Access to PC Magazine's On-line Service

PC Magazine operates a 24-hour-a-day interactive dial-up service where readers can find the utilities published in every issue, download an index of all product reviews, share opinions with the editors, and gain access to Computer Library and Consumer Reference Library.

How to Subscribe Right Now!

You can join PC MagNet with one phone call.

1. Choose a phone number by following the directions under "Finding the Number in Your Town" (below)
2. Set your communications software to 300, 1,200, or 2,400 bits per second, 7 data bits, even parity, 1 stop bit, and full duplex.
3. Dial the local number. When you connect, type Ctrl-C.
4. At the HOST NAME prompt, type CIS.
5. At the USER ID prompt, type 177000,5000.
6. At the PASSWORD prompt, type PC*MAGNET.
7. At the ENTER AGREEMENT NUMBER prompt, type Z10D9100.
8. Register your name and enter your MasterCard, Visa, or American Express card number. (If you'd like to have your company billed instead, call CompuServe at 800-848-8990.)
9. Your personal User ID and Password will be displayed at the end of the registration process. Record them for logging on over the next few days; a new password will arrive in the mail within ten days to confirm your subscription.

There are no up-front subscription charges; you pay only for the time you spend on-line. CompuServe members can join by entering GO PCMAG at any CompuServe "I" prompt. CompuServe Customer Service can be reached at 800-848-8990. Outside the United States, call 614-457-8650.

PC MagNet costs \$12.80 an hour for 1,200- or 2,400-bps service, or \$6.30 an hour for 300-bps service. Billing is based on 1-minute increments

Finding the Number in Your Town

Using your modem: Dial 800-346-3247. When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the number closest to you.

Using voice: Dial 800-635-6225. Follow the instructions and note the number.

HIGHEST QUALITY

BEST PRICE- PERFORMANCE

486/33 MHz EISA w/64K Cache	\$4131
486/25MHz w/8Kcache	\$1949
386/33MHz w/64K cache	\$1199
386/25MHz w/64K cache	\$1082
386/25MHz	\$997
386SX/20MHz	\$920
386SX/16MHz	\$669
286/12 MHz	\$499

Features: 1MB w/o wait state, 1.2 or 1.4 MB floppy drive, 1 parallel/2 serial ports, 101 Keyboard, Floppy/IDE controller & 200W power supply



MOST EXTENSIVE CUSTOMER SUPPORT IN PC INDUSTRY

- One-year on-site Warranty
- Toll-free technical hot-line
- 30-day money back guarantee
- On-site maintenance by TRW throughout USA and Canada
- Free Installation of DOS if purchased with system
- Other software loaded at our low hourly rate

**Nationwide
Training in
home/office.
Start-up course,
only \$99.**

- 1 hrs operator training in home/office (up to 4 persons) \$99
- Network design and installation
- Two and three year on-site extended warranty
- Driver and Application Software written
- Free Installation video tape

HARD DRIVE OPTIONS

IDE	ESDI w/ controllers
40 MB\$ 257	150 MB\$1,283
80 MB422	340 MB1,770
100 MB569	650 MB2,711
120 MB597	SCSI
179 MB786	1 GB\$5,580
200 MB879	Erasable optical cartridge

DISPLAY OPTIONS

(price includes monitor & adapter)

12" Mono TTL.	720 x 350	 \$135
14" Mono VGA.	640 x 480	 257
14" Color VGA.	640 x 480	.52384
14" Color VGA.	640 x 480	.41425
14" Color VGA.	1024 x 768	28519
16" Color VGA.	1024 x 768	.31933
20" Color VGA.	1024x768	311948

LOW COST PRINTERS

4 PPM	Okidata Laser	\$741
8PPM	Postscript Laser	2,254
9 Pin	NX-1001	149
24 Pin	NX-2420	call
Free 6 Foot Parallel Cable Included		
Other Models Available		

GSA SCHEDULE PRICES FOR ACTIVE/RETIRED MILITARY & FEDERAL EMPLOYEES

Federal/Military/Active/Retired employees, with proper ID, are invited to purchase computers at Iverson's GSA prices...the government's own special prices. GSA price offer limited to GSA schedule products. (Contract prices established by subsidiary, International Technology Corp., with GSA Contract Number: GSOOK90AGS5276. Some configurations not available on GSA contract.) Call to receive GSA quote or to place an order.

ORDER TODAY

1-800-444-PC90

**EXPERIENCED
SUPPORT**

SINCE
1978

**FINANCIAL
STRENGTH**

CURRENT
ASSETS
(9/30/90)
\$17 million

P.O. Box 6250 • 1356 Beverly Road
McLean, Virginia, 22106-6250

IVERSON COMPUTER CORPORATION

A Subsidiary of

IVERSON TECH

CIRCLE 480 ON READER SERVICE CARD

Printer Sharing Solutions

5 or 10 Ports



- * **Reliable Automatic Switching**
- * **Easy to Install and Use**
- * **No PC RAM Memory Required**
- * **Toll-Free Technical Support**
- * **45-Day Money-Back Guarantee**



HWP *5 Ports*

HWP-256	with 256KB	\$325
HWP-512	with 512KB	\$375
HWP-1000	with 1MB	\$425

User Upgradable Memory:
From 256KB to 16MB buffer

Input/Output Settings – 4/1 or 3/2:
All parallel ports; user configurable as either three inputs to two outputs, or four inputs to one output, buffered auto-switch

Rapid Data Transfer – 100,000 cps:
The HWP uses Direct Memory Access (DMA) for data transfers into the buffer, making the HWP hardware capable of receiving parallel data at the high rate of 100,000 characters per second.

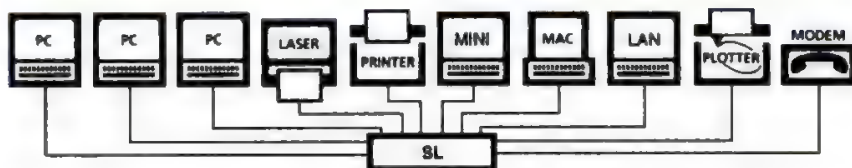
Pop-up Menu or Front Panel Buttons:
Use either the pop-up menu or the front panel switches to select printers, select the next available printer, send multiple copies, clear data, and other functions.

AS-41 *5 Ports* *\$200*

Smart Switch – No Pop-up or Buffer:
Four parallel inputs to one parallel output, electronic automatic switch with no buffer

SPPS (not shown) *\$100*

Interface Converter – No Buffer
Combination serial-to-parallel, or parallel-to-serial interface converter in a single unit; low-power CMOS design derives power from serial connection, no power supply needed; supports 9,600 to 115,200 bps, DIP switch configurable



Save Money by Sharing Office Resources:

The SL is the peripheral sharing solution which enables everyone to share lasers, printers, plotters, and modems. The HWP is ideally suited for sending large graphics files, but is economical enough for any kind of printing within a small workgroup.

Greater access by more users reduces unproductive idle time and the expense of purchasing additional peripherals. With a buffer, all users can simultaneously send print data and quickly release their PCs to continue working.

BUFFALO

We are the world's largest manufacturer of buffered data switches for PCs which assures your getting the best value and highest performance from our products.

Call For More Information
(800) 345-2356
Fax (503) 585-4505

Buffalo Products, Inc.
2805 19th St. SE, Salem, OR 97302-1520

SL or SLP *10 Ports*

SL or SLP-256	with 256KB	\$495
SL or SLP-512	with 512KB	\$575
SL or SLP-1000	with 1MB	\$675

Two Configurations – Ten Ports Each:
SL – four parallel and six serial ports
SLP – eight parallel and two serial ports
Both include 15 ft. serial null-modem cable

User Upgradable Memory:
From 256KB to 4MB buffer

Any Combination of Printers or PCs:
All ten SL or SLP ports can be software configured as either input or output.

Automatically Routes and Buffers Data:
Automatic switching and queuing of jobs; automatically converts data from parallel-to-serial or serial-to-parallel

115,200 bps PC-to-PC File Transfers:
Transfer files serially between PCs up to 115,200 bps; buffer serial data to the SL several times faster than normal 9,600 bps

Pop-up Menu via Hotkeys or Mouse:
Keyboard selection of printers and many other control functions; pop-up is for convenience, but is not required

Simple Installation:
Plug in your cables; if desired, run the installation software for the pop-up menu

CIRCLE 328 ON READER SERVICE CARD

by
Charles Petzold

Environments

After my columns on the *Microsoft Windows 3.0* palette manager, I planned to adapt some of the sample code to the Presentation Manager in order to use the new palette manager that's being introduced in OS/2 2.0. However, as I'm writing this in mid-January, the most recent version of OS/2 2.0 I have is the second beta release, and the palette manager is still quite buggy. I've successfully persuaded the palette manager to work, yet it does strange things to the PM environment and requires frequent rebooting.

Given recent decisions between IBM and Microsoft regarding the future development of OS/2 2.0 (more on that in the next column), it's not clear when the next beta release of OS/2 2.0 will be distributed. For this reason, I don't want to show any sample code just yet, but I can discuss the palette manager functions being added to PM.

The full implications of adding palette support to the OS/2 Graphics Programming Interface (GPI) aren't yet clear. In particular, I'm not sure how the palette manager and logical color tables interact.

The palette managers in OS/2 2.0 and *Windows 3.0* are similar in overall design, yet they're quite different in function format. Interestingly enough, one of the criticisms of the PM API is that it relies too much on structures—a particular annoyance for often-used functions such as *GpiMove*, *GpiLine*, and *GpiBitBlt*. Yet the *Windows* palette manager is even more oriented toward structures than PM. Figure 1 is a list of the OS/2 and *Windows* palette manager functions paired in a rough equivalence.

A BRIEF REFRESHER

The Graphics Programming Interface in OS/2 defines two types of color tables: *physical* and *logical*. The physical color table is the total array of RGB (red-green-blue) colors available on the output device. The physical color table has 16 entries for the VGA, 256 entries for the 8514/A and some Super VGA boards, and

Comparing the OS/2 2.0 And Windows 3.0 Palette Managers

- The palette managers in OS/2 2.0 and *Windows 3.0* are similar in overall design, but quite different in function format.

16,777,216 entries for 24-bit color boards.

One major difference between OS/2 2.0 and *Windows* involves the definition of colors in the default palette for video boards offering more than 16 colors. The GPI video driver defines the entire palette (256 colors for the 8514/A) while *Windows* reserves only 20 standard colors and requires using the palette manager to go beyond these 20. The default 8514/A palette under OS/2 2.0 includes 32 gray shades, for example, making use of the palette manager unnecessary in cases where a *Windows* program would be forced to use it.

Under OS/2, you can obtain the physical color table by calling *GpiQueryRealColors*. I believe this function should reflect changes to the physical color table when programs change it through the palette manager, but I can't verify it. In the second beta release of OS/2 2.0, the function hangs after a palette has been selected in a presentation space and realized. If what I believe is so, then *GpiQueryRealColors* is roughly equivalent to the *Windows* *GetSystemPaletteEntries* function.

The other type of color table in GPI, the logical color table, is always associated with a particular presentation space. This table determines how color indexes

used in functions such as *GpiSetColor* map to RGB color values. By default, the logical color table uses indexes from 0 to 15 to map to the 16 standard light and dark colors.

A special type of the logical color table is the realizable logical color table. In OS/2 1.1 and 1.2, the realizable logical color table was documented as being able to change the system palette—but no display driver implemented this facility. (I understand that realizable logical color tables are implemented in OS/2 1.3 and possibly OS/2 1.21, so it's not clear yet whether they'll be removed for the retail Version of OS/2 2.0. Virtually all of my OS/2 work now uses Version 2.0, so I haven't been very interested in these intermediary 16-bit versions of OS/2.)

TESTING FOR PALETTE SUPPORT

An OS/2 2.0 Presentation Manager program can test for palette support by first calling *DevQueryCaps* with the *CAPS_ADDITIONAL_GRAPHICS* parameter.

```
LONG lCaps ;  
...  
DevQueryCaps (hdc,  
    CAPS_ADDITIONAL_GRAPHICS,  
    1L, &lCaps) ;
```

The first parameter is a device context handle for the video display. On return, *lCaps* is a set of bit flags that indicate whether or not certain graphics features are supported by the display driver. You can test for palette support by using the *CAPS_PALETTE_MANAGER* constant.

Environments

If the expression:

```
lCaps & CAPS_PALETTE_MANAGER
```

is true, it means that the driver supports the palette manager. Generally, only video displays that support more than 16 simultaneous colors provide palette support. The size of the palette is the same as the number of colors in the physical color table. You can obtain this value using DevQueryCaps with the CAPS_PHYS_COLORS constant.

In *Windows 3.0*, checking for palette support is very similar. You use the GetDeviceCaps function with the RAS-TERCAPS constant and check whether the RC_PALETTE bit is set. However, the size of the palette is obtained from GetDeviceCaps using the SIZEPALETTE constant; this is generally larger than the number of colors normally available on the display without using the palette manager. The number of colors available can be obtained from GetDeviceCaps, using the NUMCOLORS or NUMRESERVED constants.

CREATING THE PALETTE

In OS/2 2.0, palette tables are referenced by a handle. A palette handle has the data type HPAL. (In *Windows 3.0*, the palette handle is defined as HPALETTE.)

To create a palette table under OS/2 2.0, you call GpiCreatePalette:

```
HPAL hpal ;
....
hpal = GpiCreatePalette (hab,
    flOptions, lFormat, lStart,
    lCount, palTable) ;
```

These parameters are very similar to those used in the GpiCreateLogColorTable, except that the first parameter to GpiCreatePalette is **hab** (the anchor block handle) rather than **hps** (the presentation space handle). This is because the palette table is initially independent of a particular presentation space. (In *Windows 3.0*, the palette is also initially independent of a particular device context.)

The **flOptions** parameter can include the flags LCOL_PURECOLOR and LCOL_OVERRIDE_DEFAULT_COLORS. The first flag prevents the use of dithering in rendering colors not available in

the physical color table. LCOL_OVERRIDE_DEFAULT_COLORS indicates that the program wants access to the full physical color table rather than just the colors not used as system colors. (System colors are those used in title bars, scroll bars, menus, and so forth.) If this flag is included, the colors used for such user interface items may change when the palette is realized.

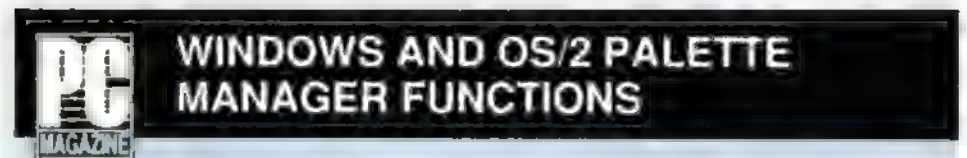
Thus, using this flag is the equivalent of calling SetSystemPaletteUse with the SYSPAL_NOSTATIC flag in *Windows 3.0*. Although the preliminary OS/2 2.0 documentation doesn't mention anything about it, it's a good idea to change system colors to black and white when LCOL_OVERRIDE_DEFAULT_COLORS is being used. There's no equivalent in OS/2 2.0 to the GetSystemPaletteUse function.

Although the palette table itself is generally a series of RGB color values, each of these RGB values is associated with a color index that the program uses for specifying color. The **lFormat** parameter must be either LCOLF_INDRGB or LCOLF_CONSECRGB. This specifies whether the palette table consists of alternating indexes and RGB color values (LCOLF_INDRGB) or just RGB values (LCOLF_CONSECRGB).

The **lStart** parameter is ignored if the format of the palette table is LCOLF_INDRGB. Otherwise, it specifies the initial index of the RGB colors in the palette table. The **lCount** parameter indicates the size of the palette table, including any indexes. For the LCOLF_INDRGB format, this number must be even—double the number of RGB colors in the palette table.

The palette table itself is specified in the last parameter as an array of 32-bit RGB color values (or alternating indexes and color values) where the high byte of the RGB values is normally set to zero. For convenience, you can also use an array of 4-byte RGB2 structures.

The high byte of the RGB color values can also be set to PC_RESERVED or PC_EXPLICIT. The PC_RESERVED flag indicates that the palette entry will be



Windows 3.0	OS/2 2.0 Presentation Manager
CreatePalette & SetSystemPaletteUse	GpiCreatePalette
GetSystemPaletteUse	---
DeleteObject	GpiDeletePalette
SelectPalette	GpiSelectPalette
RealizePalette	WinRealizePalette
SetPaletteEntries	GpiSetPaletteEntries
GetPaletteEntries	GpiQueryPaletteInfo
---	GpiQueryPalette
AnimatePalette	GpiAnimatePalette
GetNearestPaletteIndex	---
ResizePalette	---
GetSystemPaletteEntries	GpiQueryRealColors

Figure 1: A rough equivalence between the *Windows 3.0* and OS/2 2.0 palette manager functions.

used as an animating entry. This is identical to the PC_RESERVED flag used in *Windows 3.0*. The PC_EXPLICIT flag indicates that the lower 3 bytes of the 32-bit LONG actually contain an index into the physical palette table. Again, this is identical to the PC_EXPLICIT flag used in *Windows 3.0*.

The equivalent that *Windows 3.0* provides for the GpiCreatePalette function is CreatePalette:

```
hpal = CreatePalette (&lp) ;
```

where **lp** is a pointer to a LOGPALETTE structure. This structure includes a version number, the size of the palette table, and an array of PALETTEENTRY structures that contain the RGB color values and flags.

SELECTING AND REALIZING

In *Windows 3.0*, you select a palette into a device context by calling

```
SelectPalette (hdc, hPalette,
    bForceBackground) ;
```

The last parameter is set to TRUE to indicate that the palette should always be a background palette (that is, it should not have priority over palettes used by other programs even if the program is in the foreground of the *Windows* session). The function returns a handle to the palette previously selected in the device context, or NULL if there is an error.

Under OS/2 2.0, you select a palette into a presentation space by calling

```
GpiSelectPalette (hps, hpal) ;
```


It's probably because they want to avoid comparison. Next to our SyncMaster™4 the differences become very apparent. Our flat screen EVGA monitor lets you have a full inch more than the NEC Multisync®4D, yet it sells for the same price.

With its 17" display, the SyncMaster 4 gives you more space to create in, from larger windows to more legible text. And the flat surface screen does it all without the strain-producing glare you get from round face displays like the Multisync 4D. When

you include its additional up front controls for easy access, our SyncMaster 4 is the clear choice.

And the SyncMaster 4 is backed by Samsung, the world's largest monitor manufacturer and the 20th largest corporation worldwide.

So if you want to see your EVGA graphics come to life, look at a Samsung. Then call 1-800-624-8999, extension 85Y for your nearest distributor.

It won't be hard to tell the difference.

	Samsung SyncMaster 4	NEC Multisync 4D
CRT		
Diagonal size	17 inches	16 inches
Maximum Display size	300mm x 224mm (HzV)	290mm x 217mm (HzV)
Screen type	Flat face	Round face
Cabinet depth	453mm	475mm
Controls	On/off up front Degauss up front pincusion up front	On/off recessed Degauss in back None
Modes	Supports EGA	None
Retail price	\$1499	\$1499

**Now you know
why they don't show
screen graphics in
their ads.**



Samsung 17" flat screen SyncMaster 4



NEC 16" round screen Multisync 4D

Unretouched Photography.



SAMSUNG

CIRCLE 316 ON READER SERVICE CARD

Technology that works for life.

Environments

The returned value is the palette previously selected into the presentation space, NULL if no palette was previously selected, or `PAL_ERROR (-1L)` if an error results. An error can result from an invalid presentation space handle or a "busy" presentation space—meaning that another thread is currently using it.

The second parameter of the `GpiSelectPalette` function can be set to NULL to return the presentation space to the default palette.

Under *Windows 3.0*, you must then realize the palette by calling

```
RealizePalette (hdc) ;
```

This function changes the physical palette and consequently causes the `WM_PALETTECHANGED` message to be sent to all application windows to notify them of the change. The function returns the number of colors changed in the physical palette.

Under *OS/2 2.0*, you realize the palette by calling

```
WinRealizePalette (hwnd, hps) ;
```

This function realizes the palette selected into the presentation space specified by the second parameter. Like its *Windows* equivalent, `WinRealizePalette` returns the number of colors remapped in the physical palette or `PAL_ERROR` if an error results. A `WM_REALIZEPALETTE` message is defined in the `PMWIN.H` header file for *OS/2 2.0*, but I haven't found any documentation for it. I believe this message is similar to the *Windows* `WM_PALETTECHANGED` message.

Under *OS/2 2.0*, you can determine the palette currently selected in the presentation space by calling

```
hpal = GpiQueryPalette (hps) ;
```

The return value can be NULL if no palette is selected in the presentation space, or `PAL_ERROR` if an error occurs. There is no equivalent function in *Windows 3.0*.

ALTERING AND DELETING

Under *Windows 3.0*, you can later change the entries in the logical palette table by calling `SetPaletteEntries`. Although you can change the entries even if the palette

has been selected into a device context, the physical palette will not change until `RealizePalette` is called again. If necessary, you can change the size of the logical palette by calling `ResizePalette`. To obtain the entries in the logical palette, you use `GetPaletteEntries`.

Under *OS/2 2.0*, you can change entries in the palette table by calling

```
GpiSetPaletteEntries (hpal,
                      lFormat, lStart, lCount,
                      palTable) ;
```

The last four parameters are the same as those to `GpiCreatePalette`. There is no GPI function to change the size of the palette table explicitly, although `GpiSetPaletteEntries` can change the size. As with the *Windows* equivalent, changes in the palette table are not reflected in the physical palette until `WinRealizePalette` is called.

Using a palette for animation requires that the RGB color values change more quickly than possible using the `GpiSetPaletteEntries` function. In `GpiCreatePalette`, you use the `PC_RESERVED` flag for all entries that will be used for animation. To change these colors you call

```
GpiAnimatePalette (hpal, lFormat,
                  lStart, lCount, palTable) ;
```

If the palette is selected in a presentation space, then the colors change quickly. This function is similar to the *Windows 3.0* function `AnimatePalette`.

To obtain the current entries in the palette table, you call

```
GpiQueryPaletteInfo (hpal, hps,
                    flOptions, lStart, lCount,
                    palArray) ;
```

If `hpal` is a handle to a palette table, the function returns information about that palette. If `hpal` is NULL, then `hps` must be a handle to a presentation space, in which case the function returns the default logical color table.

Under *Windows 3.0*, you delete a logical palette table the same way you delete other GDI objects—by calling `DeleteObject`. Under *OS/2 2.0*, you delete a palette table by calling

```
GpiDeletePalette (hpal) ;
```

As in *Windows*, a palette table cannot be deleted while it is still selected into a presentation space.

COLOR SELECTION

Under *Windows 3.0*, you can define a color using one of three different macros. The `RGB` macro selects a pure standard color or a dithered color. The `PAL-ETTERGB` and `PALETTEINDEX` macros select colors from a palette—the first uses an RGB color value; the second uses an index into the palette table.

Under *OS/2 2.0*, you specify colors using a color index. Normally, these are values from 0 to 15 that select the standard colors. If a palette has been selected in the presentation space, then it is the index used in the palette table. Thus, the palette table works similarly to the GPI logical color table.

But it isn't clear yet how palette tables and logical color tables interact. For example, you should be able to use `GpiCreateLogColorTable` to switch to an RGB color table, and then use RGB color values to select colors from the palette. However, I haven't gotten this to work in the second beta release of *OS/2 2.0*.

ANY INCONSISTENCIES?

As far as I can determine, GPI has none of the inconsistencies between standard colors, dithered colors, and palette colors that *Windows 3.0* does, as I discussed in the last issue. Dithered colors are very similar to palette colors.

But this is not to say that all is well. After thinking about the problems of color selection (particularly on graphics output devices), I'm convinced that color selection must be standardized so that different output devices render the same colors (to the best of their ability). Color selection should be related more to human visual perception than to the color-rendering peculiarities of output devices.

This means that if RGB continues to be the color model used in GPI and *Windows*, the RGB colors specified by an application must not be those that the system loads into the palette table on the video board. The RGB colors must be adjusted using gamma protection (discussed in the last column) based on the particular video board and monitor (or printer) being used.

I realize this is a tall order, but it must be done. In the last issue I recommended that Microsoft address the problem of color selection in *Windows*. IBM must do the same with the *OS/2* Presentation Manager. Let's hope that these two companies talk with each other and provide similar solutions. ■

Crunch!

Nothing crunches numbers like the Advanced Math Co-Processors from Integrated Information Technology. They really speed up graphics, CAD/CAE, spreadsheets, and other calculation-intensive applications.

Three models provide a perfect match to your 286, 386, or SX PC, delivering up to twice the performance of other CoProcessors. No wonder hundreds of thousands have been sold. Five-year limited warranty. BYTE-rated. So plug in, and crunch!

Count on iit.SM

INTEGRATED
INFORMATION

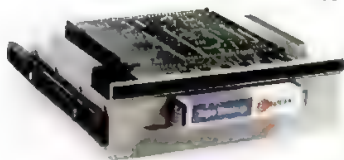
Available at most local dealers.

Perfect 10. Still Peanuts.

Thanks to *PC Week* for rating our Jumbo a Perfect 10 in a recent product review. But our customers who are already using Jumbo knew it all along.

120MB just \$399.

With new, longer tape cartridges and data compression, Jumbo delivers up



to 120MB of tape backup storage—fast. It reads and writes industry standard QIC formats and works with IBM® PC, XT, AT, 386™, PS/2™ and compatibles.

Jumbo also offers an unattended scheduler for backing up at night or on weekends. And it's fully network compatible with Novell®, 3COM®, PC Net®, and optional Xenix®/UNIX® support. Everything is rated high with Jumbo except one—the price! You still get it for an incredibly low price.

Jumbo performance for peanuts.

SCOREBOARD	
Attributes	Colorado Memory Systems' Jumbo Tape Backup
Reliability of backup process	10
Integrity of backup process	10
Ease of use	10
Speed of data backup	10
Quality of documentation	10
Weighted Score	10

PC WEEK

August 14, 1989



**COLORADO
MEMORY SYSTEMS INC.**

800 S. Taft Avenue, Loveland, CO 80537
Phone: (303) 669-8000
Fax: (303) 667-0921

For the dealer nearest you, call 1-800-346-9881.

For customer support, call 1-800-432-5858.

IBM, PS/2, 3COM, Novell, PC Net, Xenix, UNIX are trademarks of their respective companies. 386 is a trademark of Intel Corporation. Scoreboard courtesy PC Week. ©1989 Colorado Memory Systems, Inc. All rights reserved.

CIRCLE 473 ON READER SERVICE CARD

by
Ray Duncan

Power Programming

Dynamic Data Exchange and the Clipboard in Windows

Although *Microsoft Windows 3.0* has two interprocess communications (IPC) mechanisms—the clipboard and Dynamic Data Exchange (DDE)—both of these mechanisms are presented by applications at such a high level of abstraction that the average user has no conception whatsoever of where they're implemented or how they work. This is as it should be. Unfortunately, as a software developer, you can't safely coast along in the same blissful ignorance as the average *Windows* user. You need to understand how the primitive DDE components we've discussed in the last two installments map onto the "preferred" user interface for *Windows* applications—and the mapping is nontrivial.

Let's consider some typical *Windows* IPC scenarios. First, suppose I have some data in an *Excel* spreadsheet and I want to incorporate a graph based on that data into a *Microsoft Word for Windows* document. I launch *Excel* (or activate *Excel* by clicking on its window or on its name in the Task List), load the *Excel* spreadsheet, select the data, and create a new chart via *Excel*'s File New Chart menu sequence. After tuning up the chart with *Excel*'s fancy formatting functions, I select the whole chart by clicking outside the plotting area and copy it to the clipboard with the Edit Copy menu sequence. Finally, I load or activate *Winword*, open my document, position the insertion point at the appropriate place within the text, and paste the graphic into the document using *Winword*'s Edit Paste menu sequence or with the key combination Shift-Ins (see Figure 1).

So far, everything seems pretty simple. By observing how applications behave, I get a vague mental image of the *Windows* clipboard as a sort of pigeonhole for data that is maintained by the system. When I use Copy or Cut commands, I can easily imagine that the application reacts by making a function call to *Windows*, passing the address of the selected data, and that

■ As an interprocess communications facility, DDE is better than nothing, but it suffers from severe limitations at both the user level and the programmer level.

Windows merely puts a copy of the data into the pigeonhole and then returns from the function call. Similarly, when I use a Paste command, I might deduce that the application makes a function call to *Windows* and gets back an address for the pigeonhole, after which it can proceed to copy data from the pigeonhole to its own workspace. It almost seems like a joke to refer

to the clipboard as an IPC mechanism at all, because it's totally passive—nothing gets communicated without active intervention from the user at both ends of the transaction.

The straightforward copy-and-paste sequence I just used is very convenient until I need to correct or extend the original data that the graph was based on. If I put a new value into the *Excel* spreadsheet, the *Excel* graph is updated immediately, but the graph in the *Winword* document doesn't change. This certainly seems reasonable: There's no obvious way *Winword* could know where the graph on the clipboard came from, or that the original version had been altered. But having faith that there ought to be a better way to get this job done, I browse through the *Winword* manual and come across a reference to data links, which sound like

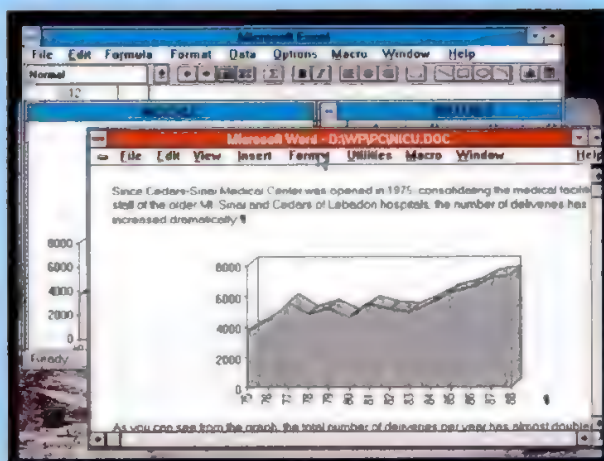


Figure 1: An example of a hot link between *Excel* and *Word for Windows*. Data is entered into an *Excel* spreadsheet, a graph is created, the graph is copied to the clipboard, and then the *Winword* Edit Paste Link command inserts the graph into a word processing document.

Power Programming

they could eliminate a lot of repetitive copying and pasting. I return to *Excel*, select the graph and use the Edit Copy sequence as before, switch to *Winword*, load my document, set the insertion point, and then invoke Edit Paste Link rather than Edit Paste.

The result is gratifying: the graph magically appears in the document, just as it did in our first experiment, but now, whenever I activate *Excel* and change the spreadsheet data, alterations in the graph are immediately reflected in the *Winword* document, too. The unavoidable conclusion is that a DDE transaction is going on between *Excel* and *Winword*, and a little spelunking with the shareware utility DDEWatch shows, sure enough, that the Paste Link operation triggers a whole flurry of DDE messages (see Figure 2).

Our previous mental model of the *Windows* clipboard as a dumb pigeon-hole for some data doesn't account for this application behavior at all. Even though we used the exact same Edit Copy command at the *Excel* end of things on both

occasions, the *Winword* Paste operation simply sucked in a static image, while the *Winword* Paste Link operation was somehow handed enough information to set up a DDE conversation with *Excel* as the server. Evidently, the *Windows* Clipboard (like nearly everything else in *Windows*) is a lot more complicated than it appears at first glance.

THE CLIPBOARD AND DDE

The first thing to realize is that the *Windows* Clipboard utility program, which appears in the Program Manager's Accessories program group, bears almost no resemblance to the structure of the *Windows* clipboard at the system level. The Clipboard program is a particular class of application known as a *clipboard viewer*, which processes special *Windows* messages and knows how to display data in a number of different formats. The system-level clipboard, on the other hand, is actually a miniature indexed database of pointers to global memory blocks, along with information about the type of data contained in the blocks. The clipboard doesn't have any intrinsic capabilities for processing or displaying data that applications place "on the clipboard," allo-

cating memory to hold such data, or even for validating data by determining whether it is truly in the specified format; applications that use the clipboard rely completely on a set of formatting conventions and on each other's good behavior.

Let's look at a prototypical sequence for putting a chunk of data on the clipboard. The application first allocates a global memory block, locks the block, places the data of interest in the block, and unlocks the block again. It then calls, in succession, the *Windows* functions *OpenClipboard()*, *EmptyClipboard()*, *SetClipboardData()*, and *CloseClipboard()*. *OpenClipboard()*'s parameter is the application's window handle, required so that *Windows* can track the owner of the data in the clipboard and keep other applications from changing the data in the clipboard while it is being inspected or altered. *SetClipboardData()* has two parameters: a "magic number" (reserved identifier) for the clipboard data format and the handle to the global memory block.

EmptyClipboard() and *CloseClipboard()* do not require any arguments. *Windows*, Versions 2.0 and 3.0, define a number of different "clipboard data formats." These are listed together with their identifiers in Figure 3; applications are also allowed to register and use private clipboard data formats.

When an application wants to fetch data from the clipboard to support a Paste operation, it uses a similar sequence of *Windows* function calls: *OpenClipboard()*, *GetClipboardData()*, and *CloseClipboard()*. *OpenClipboard()* and *CloseClipboard()* have already been described; *GetClipboardData()* accepts the identifier for a clipboard data format and returns the handle to a global memory block or NULL if the specified data format is not available. Once it has the handle, the application can lock the memory block to obtain a far pointer, copy the data to its data segment or to another global memory block of its own, then unlock the block again before closing the clipboard. The application must not free the memory block offered by the clipboard, because this would make multiple Paste operations on the same data impossible; the memory block will be freed automatically by the system at the time of the next call to the *EmptyClipboard()* function.

A subtle but important feature of *Windows*' clipboard mechanisms is that the Copying application is allowed to make more than one call to *SetClipboard-*

DDE MESSAGE EXCHANGE BETWEEN EXCEL AND WORD FOR WINDOWS		
WinWord → Excel	Initiate	Excel C:\EXCEL\NICUBEDS.XLC
WinWord ← Excel	Ack	Excel C:\EXCEL\NICUBEDS.XLC
WinWord → Excel	Advise	AckReq Fmt=Rich Text Format Chart
WinWord ← Excel	Ack	Negative App=00 Chart
WinWord → Excel	Advise	AckReq Fmt=Text Chart
WinWord ← Excel	Ack	Negative App=00 Chart
WinWord → Excel	Advise	AckReq Fmt=Printer_Picture Chart
WinWord ← Excel	Ack	App=00 Chart
WinWord → Excel	Request	Fmt=Printer_Picture Chart
WinWord ← Excel	Data	Response Release Size=32 Fmt=Printer_Picture Chart
WinWord → Excel	Terminate	
WinWord ← Excel	Terminate	

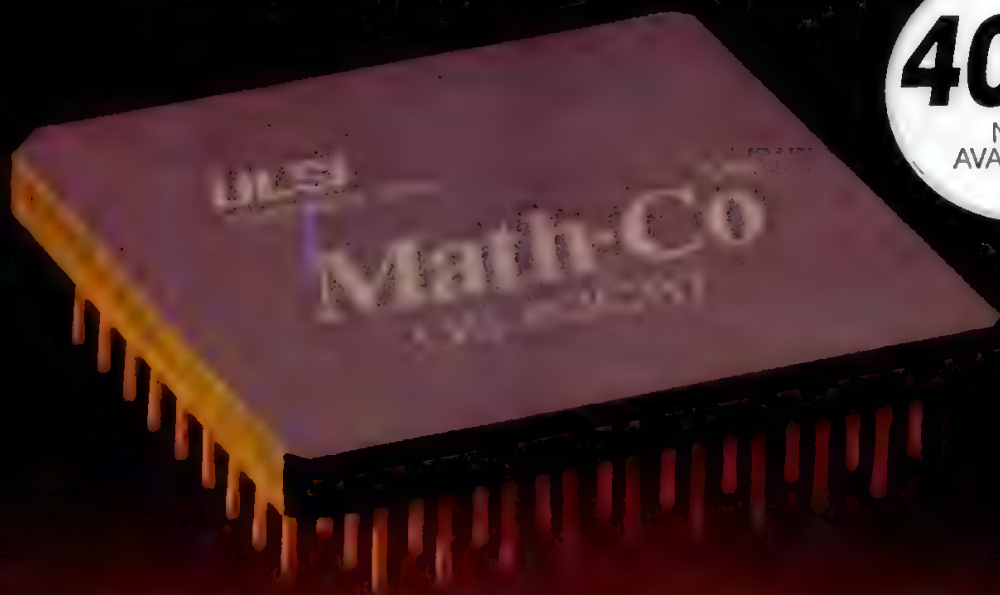
Figure 2: DDE message exchange between *Excel* and *Word for Windows*, provoked by a Paste Link operation in *Winword*. This is an edited version of the message log produced by DDEWatch, Version 1.3, a shareware *Windows* utility from Horizon Technologies (517-347-0800). The arrows in the left column indicate the direction of the message traffic; the names in the middle column correspond to the *Windows* DDE messages WM_DDE_INITIATE, WM_DDE_ACK, and so on; the right column provides an additional description of the message or the data to which the message refers.

In the first two messages, *Winword* is using the information it got from the CF_LINK entry on the clipboard to initiate a DDE conversation with *Excel*. The next six messages show *Winword* trying to establish a hot link, polling *Excel* with WM_DDE_ADVISE messages specifying various data formats until it finds one that *Excel* is willing to provide. The WM_DDE_REQUEST/WM_DDE_DATA message pair represents the actual transfer of the chart graphic, and the exchange of WM_DDE_TERMINATE messages occurs when *Winword*'s Exit command is selected.

The New Generation

MATH COPROCESSOR

40MHz
NOW
AVAILABLE



Lifetime Warranty • 30-Day Money-Back No-Risk Guarantee • Over 20% Lower List Price

Industrial Strength

The ULSI Math•Co™ US83C87 from Specialty Development Corporation is a high performance CMOS math coprocessor that is software compatible with applications designed to operate with all 386 computers. The Math•Co™ is available in speeds up to 40 MHz.

Fewer Clock Cycles Required

The Math•Co™ is designed to perform floating point instructions in far fewer clock cycles than the Intel® 80387. The superior design of the Math•Co™ enables you to achieve maximum performance from your system.

Lifetime Warranty • 30-Day Money-Back Guarantee

If at any time during the first 30 days of purchase, you are not satisfied with the Math•Co™, you may return it, along with your purchase receipt to Specialty Development Corporation for a full refund of purchase price. This Money-Back Guarantee along with our industry-first Lifetime Warranty represent our confidence in this new generation math coprocessor.

Comparison Of Clock Cycles Required

Instruction	Math•Co™	Intel®
Add	3	18
MPY	12	22
DIV	40	80
SQRT	37-41	125
REM	68-72	155

Lower Prices

The suggested list price for the Math•Co™ is over 20% lower than Intel's® math coprocessors' suggested retail prices.

Complete Compatibility

The Math•Co™ is completely compatible with industry standards, used world-wide by not only scientists and

programmers, but the general business community – individuals who want to speed up applications like databases and statistics.

Experience the New Generation of Math Coprocessors

Plug in the Math•Co™ from ULSI and sit back for a fast ride through your most cumbersome applications. No more long wait times. The Math•Co™, with its 30-Day Money-Back Guarantee and Lifetime Warranty, now is the time to plug in the Math•Co™. Call SDC today, 1-800-284-7732, for the name of the dealer nearest you.

Toll Free Support • Made in the USA



SPECIALTY DEVELOPMENT CORPORATION

100-2847732 • 100-2847732 • 100-2847732 • 100-2847732 • 100-2847732 • 100-2847732 • 100-2847732 • 100-2847732

©1991 SPECIALTY DEVELOPMENT CORP. ALL RIGHTS RESERVED. MATH•CO IS A REGISTERED TRADEMARK OF SPECIALTY DEVELOPMENT CORP.
CIRCLE 346 ON READER SERVICE CARD

Power Programming

Data()—each with a different clipboard data format—while it has the clipboard open. In fact, a well-behaved *Windows* application is obligated to present, or *render*, the data being copied to the clipboard in as many different data formats as it can, in order to maximize the likelihood that any other application trying to paste the data later will find a format it can use. For example, if you select and Copy an array of cells from an *Excel* spreadsheet and then run the Clipboard viewer, you'll find that not only is the data present on the clipboard as an ASCII string (CF_TEXT, with the cell values separated by tab characters), but it's also present as a bitmap (CF_BITMAP), a metafile picture (CF_METAFILEPICT), and a link (CF_LINK) record that contains the application name, topic name (in this case, the spreadsheet filename), and item (expressed as a range of cell coordinates).

Windows assists the pasting application in picking and choosing among the data formats offered on the clipboard in several ways. The IsClipboardFormatAvailable() function can be called with a clip-

**A well-behaved
Windows application
is obligated to present
the data being copied
to the clipboard in
as many data formats
as it can.**

board data format identifier; it doesn't require the application to have previously opened the clipboard.

The function returns a true or false flag only (this is most useful when an application is displaying its Edit menu and must decide whether to "gray out" the Paste command). There is also a CountClipboardFormats() function, which returns the total number of data formats currently held by the clipboard, and an EnumClipboardFormats() function, which allows the application to list, or enumerate, the data formats. Once committed to a Paste operation, the typical application will call EnumClipboardFormats(), inspect the resulting list to find the richest or most complex data format that it can understand, and then import the data.

At this point—to return to the original

reason for this discussion of the clipboard—the explanation of *Winword*'s different behavior for Paste and Paste Link is obvious. When you request a Paste operation, *Winword* looks in the clipboard for data in a literal format such as CF_TEXT or CF_BITMAP; when you select a Paste Link operation, *Winword* queries the clipboard for a CF_LINK data item that will supply the information necessary to carry out a DDE transaction. The clipboard and DDE, which appeared at first glance to be mutually exclusive, have thus been revealed as being closely interdependent after all. It seems to be an inescapable paradox of graphical user interfaces that mechanisms such as the clipboard and DDE—which appear so natural and intuitive to the user—require the most convoluted and unintuitive coding on the part of the programmer!

DDE PROBLEMS AND LIMITATIONS

Although DDE as an interprocess communications facility is better than nothing, it certainly suffers from some severe problems and limitations. At the user level, DDE is notorious for its fragility and its erratic behavior when the system is heavily loaded. Even the creation of the simple hot-linked spreadsheet, graph, and document shown in Figure 1 caused *Winword* to terminate unexpectedly on several occasions, and *Winword* went into a complete panic when I accidentally changed the name of the chart after the hot link had been established.

DDE is also awkward to use because of the "one-way" operation of the DDE linkage. For example, there is absolutely no way for the user to determine, when looking at a Paste Linked graphic in a *Winword* document, what application was responsible for creating the graphic and how to load that application in order to change the graphic.

At the programmer level, DDE is even more of a pain. A DDE transaction demands many exchanges of special *Windows* messages, allocations/deallocations and lockings/unlockings of global memory blocks, and creations/destructions of global atoms. Any of these operations may fail unexpectedly, leaving the DDE transaction in limbo. Or one of the applications in the transaction may suddenly be aborted by the *Windows* supervisor, leaving the other party to the DDE conversation high and dry. The complexity of DDE programming is aggravated by the fact that DDE protocols are largely empirical, based

CLIPBOARD DATA FORMATS AND THEIR IDENTIFIERS	
Identifier	Data format
CF_TEXT	Null-terminated (ASCII) text.
CF_OEMTEXT	Null-terminated text in the OEM character set.
CF_METAFILEPICT	Metafile picture structure, which includes the metafile mapping mode, dimensions, and a pointer to the actual metafile data stream.
CF_BITMAP	Device-dependent bitmap.
CF_DIB	Device-independent bitmap.
CF_SYLK	SYLK (Symbolic Link) standard data format (used by <i>Multiplan</i> , <i>Excel</i> , and others).
CF_DIF	DIF (Data Interchange Format) standard data format (originally used by <i>VisiCalc</i> , now owned by Lotus Corp.).
CF_TIFF	TIFF (tagged-image file format) standard data format for bitmaps (used or understood by many painting, drawing, and screen-capture programs).
CF_PALETTE	A color palette, often used in conjunction with a bitmap specified by CF_DIB.
F_LINK	A series of three ASCII strings identifying a DDE server, topic, and data item, the entire set of strings being terminated by an additional null byte. This clipboard format is registered and used by applications that support warm or hot links.

Figure 3: The identifiers for the standard clipboard data formats used in *Windows*, Versions 2.0 and 3.0. With the exception of CF_LINK, these identifiers are defined in the WINDOWS.H header file in the *Windows* Software Development Kit (CF_LINK is registered on the fly by applications that support hot or warm DDE links). Additional formats are defined for Microsoft's Object Linking and Embedding (OLE), and applications can also register and use private clipboard data formats.

Power Programming



FUNCTION CALLS EXPORTED BY THE DDEML

<code>DdeAbandonTransaction()</code>	Abandons an asynchronous DDE transaction, automatically releasing any resources used in the transaction.
<code>DdeAccessData()</code>	Returns the base address and length of the data associated with a specific data container handle; see also <code>DdeCreateDataHandle()</code> and <code>DdeAddData()</code> . The data is read-only. This call must be followed by a call to <code>DdeUnaccessData()</code> .
<code>DdeAddData()</code>	Appends data to the data previously associated with the specified handle.
<code>DdeClientTransaction()</code>	Requests a synchronous or asynchronous data transaction within an existing DDE conversation.
<code>DdeCmpStringHandles()</code>	Given two string handles, performs a case-insensitive comparison of the strings and returns the result (analogous to the C runtime library function <code>strcmpi</code>).
<code>DdeConnect()</code>	Creates a DDE conversation with a server, using the specified DDE application name and topic name.
<code>DdeConnectList()</code>	Superset of <code>DdeConnect()</code> ; creates a conversation with all available servers that match the specified application name, topic, and language criteria.
<code>DdeCreateDataHandle()</code>	Creates a data container, initializes the container's contents, and returns a handle.
<code>DdeCreateStringHandle()</code>	Creates a container for a string and returns a handle. Unlike data containers, the storage for identical strings is shared between applications.
<code>DdeDisconnect()</code>	Terminates a DDE conversation previously established with <code>DdeConnect()</code> or <code>DdeConnectList()</code> . Any incomplete transactions are abandoned, and any resources they are using are released.
<code>DdeDisconnectList()</code>	Terminates all the DDE conversations previously established with a particular call to <code>DdeConnectList()</code> .
<code>DdeEnableCallback()</code>	Enables or disables client or server callbacks. Callbacks are used to notify a client or server of an asynchronous event (for example, the completion of an asynchronous DDE transaction).
<code>DdeFreeDataHandle()</code>	Releases the handle for a data container that was previously allocated by <code>DdeCreateDataHandle()</code> .
<code>DdeFreeStringHandle()</code>	Releases the handle for a string container that was previously obtained with <code>DdeCreateStringHandle()</code> .
<code>DdeGetData()</code>	Copies the data corresponding to the specified data container handle into application memory.
<code>DdeGetLastError()</code>	Returns more-detailed information about the cause of the most recent DDEML error.
<code>DdeInitialize()</code>	Called by an application to initialize the DDEML library before using any other DDEML function calls.
<code>DdeKeepStringHandle()</code>	Notifies DDEML to maintain a string handle after the client or server exits from the callback routine to which the handle was passed.
<code>DdePostAdvise()</code>	Issued by a server application whenever there is a change to data that has been hot-linked by a client.
<code>DdeQueryConvInfo()</code>	Returns information the server and client engaged in a particular DDE conversation.
<code>DdeQueryNextServer()</code>	Returns the next DDE conversation handle associated with a conversation list created by <code>DdeConnectList()</code> .
<code>DdeQueryString()</code>	Returns the string associated with the specified string handle.
<code>DdeNameService()</code>	Used by DDE server applications to register or unregister the application names that they will respond to.
<code>DdeSetUserHandle()</code>	Associates an arbitrary 32-bit value with a DDE conversation handle and transaction. This value's meaning is application-dependent and can be retrieved with <code>DdeQueryConvInfo()</code> .
<code>DdeUnaccessData()</code>	Releases a data pointer previously obtained with <code>DdeAccessData()</code> .

Figure 4: A summary of the function calls exported by Microsoft's new Dynamic Data Exchange Management Library (DDEML). The DDEML hides the details of DDE messages, memory blocks, and global atoms from applications, providing a higher-level, more robust interface for interprocess communication using DDE.

on the behavior of *Excel* and on programmer folklore about what works and what doesn't. Finally, DDE is defined at such a primitive level that a successful DDE transaction demands idiosyncratic knowledge about each application involved. For instance, DDE does not support high-level, abstract, application-independent methods of naming data.

DDE DIRECTIONS FOR THE FUTURE

In forthcoming versions of *Windows*, Microsoft is attacking the traditional weaknesses of DDE at two levels. These innovations will first become evident to most users with the release of *Windows* 3.1, but they are implemented to various degrees in the current versions of *PowerPoint* and *Excel*, and the necessary software tools and libraries are already in the hands of many *Windows* developers.

First, Microsoft has encapsulated the gruesome details of DDE message, global memory block, and global atom handling inside a dynamic link library (DLL) called the Dynamic Data Exchange Management Library (DDEML). This library augments the traditional *Windows* API by exporting a large number of new DDE-specific functions (Figure 4), in effect, redefining the old DDE protocol at a new, higher level. The primitive components of DDE are still present, but they are hidden from the application unless the application wants to know about them; since the underlying technology is unchanged, "old" DDE-aware applications can still communicate transparently with "new" applications that use DDEML. Presumably, Microsoft has learned some lessons about unstable APIs from its OS/2 experience, and the DDEML functions in 32-bit *Windows* will closely resemble the ones that have been defined for *Windows* 3.1.

Second, Microsoft has defined a new protocol for the construction of "compound documents" (that is, documents whose components are created in more than one application) called Object Linking and Embedding (OLE). OLE is built upon DDE, but represents the relationships among document components at a much higher level. As the OLE specification says, OLE is based on a very simple conceptual model: "There are things and there are places that those things can reside." In OLE, the things are called *objects* and the places are called *containers*. When something—formatted text, a graph, or whatever—is copied from one place (container) to another, it isn't plopped

Your logical next step...

- is to get ready-to-run software created for your**
- is to organize all your company's data in a cen**
- is to build an easy-to-use system that can grow**
- is to enhance the value of your existing PCs**
- is to control your total cost of computer system**
- is to choose a system that's renowned for quali**

kind of business

tral place

as you grow

ownership

ty and support

...is an IBM AS/400.



IBM

*To learn more about
stepping up to an IBM AS/400,
call an IBM marketing rep.
Or, call us for the
44-page IBM AS/400
Solutions Catalog.
1 800 365-4 IBM, ext. 10*



The AS/400 Model C10 is just over 2 ft. tall.

Power Programming

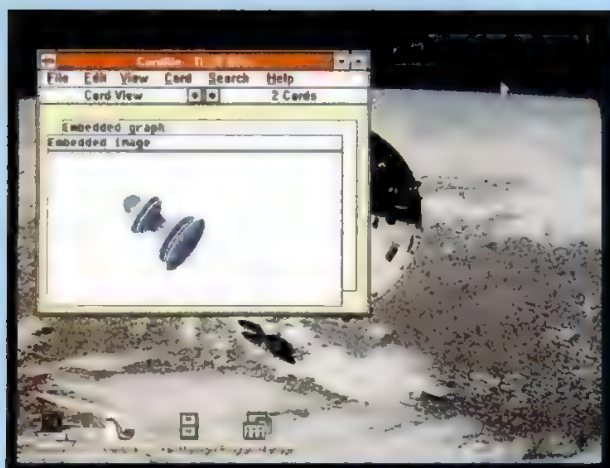


Figure 5: An experimental version of Microsoft's Cardfile application that supports Microsoft's new Object Linking and Embedding protocol (OLE) for compound documents.

down in its new location as a bunch of bits that must be understood by the container (or by the application that owns the container). Instead, it is embedded in the container as an object that has both content and behavior; the native data is hidden from the container.

What is the behavior of an OLE object? In simplest terms, it's the ability of the object to respond to generic commands (Edit yourself, Show yourself, Resize yourself) that are issued to it by the container. More specifically, the application manipulating the container uses class information associated with the object to load a class-specific dynamic link library that exports a standard set of OLE function calls. The application then calls the library entry point for the desired operation, passing a pointer to the object, and the library translates the generic OLE function request into language that the program that originally created the object can understand. We'll explore OLE in more detail in the next installment of this column; in the meantime, Figures 5 through 7 can give you some inkling of what OLE will mean to users.

These figures show an experimental version of Microsoft's Cardfile application that supports Microsoft's new Object Linking and Embedding protocol (OLE) for compound objects. First, a file containing two cards is opened. One card contains an embedded object created by the OLE-aware graphics tool supplied with *PowerPoint*, and the other contains an embedded object created by an OLE-aware version of *Paintbrush*.

The object created by *Paintbrush* is selected simply by clicking on it. Then the Properties item on Cardfile's Edit menu is chosen and a dialog box results. Clicking on the Edit Source button in the dialog box will activate *Paintbrush* and automatically load the object embedded in the Cardfile container for editing.

Clicking on the Change to Picture button in the dialog box would change the *Paintbrush* object into a static bitmap and cause it to lose its "behavior," allowing the file to be sent to someone who doesn't have access to *Paintbrush*.

THE IN-BOX

Please send your questions, comments, and suggestions to me at any of the following e-mail addresses:

PC MagNet: 72241,52

MCI Mail: rduncan

BIX: rduncan

Figure 6: The embedded object that was originally created by *Paintbrush* was selected by clicking on it. Then the Properties item on Cardfile's Edit menu was chosen, resulting in the dialog box shown here.

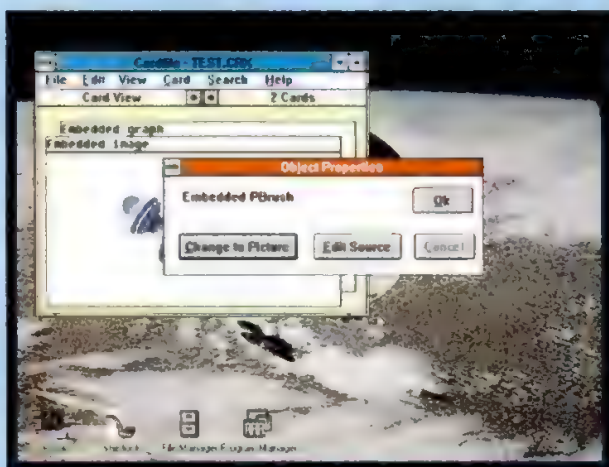
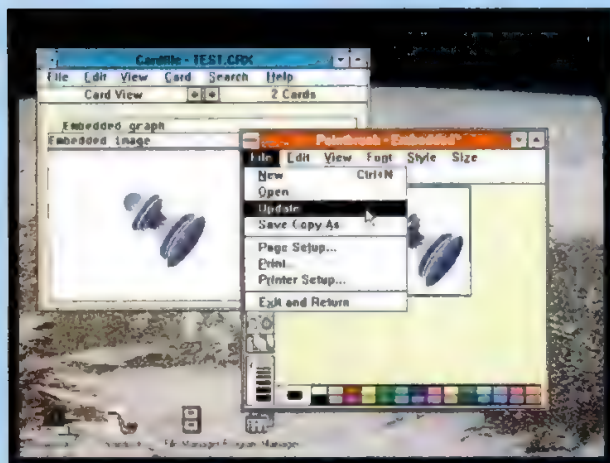


Figure 7: The result after the Edit Source button was clicked. *Paintbrush* knows that it is functioning as a slave of Cardfile and has replaced its usual File Save and File Save As... menu items with Update (which causes the edited object to be stored back into the Cardfile container).





D I G I T A L W O R L D

The Meeting Of The Minds

An extraordinary gathering
of the leaders in computing,
publishing, entertainment,
consumer electronics, film,
broadcast production,
education, music and the arts.

June 4-6, 1991 at the

Beverly Hilton Hotel

Beverly Hills, California.

Call or write for information.

Seybold Seminars

PO Box 578, Dept. M

Malibu, CA 90265

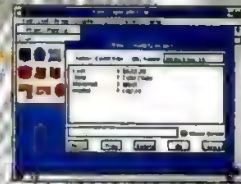
(213) 457-5850

THINX SMART: Thinx takes data and represents it as graphic images.

By linking information to images, Thinx™ software, for the first time, allows you to manipulate streams of complex data simply by moving those images. Now "Intelligent Graphics" can be used to form connections, find relationships and make judgments. For instance, offices, equipment, furniture, and people all have an effect on a building's cost, profitability and countless other aspects of its operation. Yet, with Thinx, all this can be represented and analyzed by manipulating a graphic image of the building.



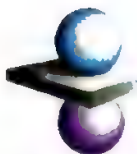
Link several databases and spreadsheets and use all the data at once.



Behind each image is an array of data that you input.

THINX FAST: Thinx works the way you like, with Windows* and the leading spreadsheets and databases.

Thinx recognizes that in order to simplify the way you work, it has to be compatible with the way you're used to working. So Thinx works under Windows 3.0. And, while Thinx has its own spreadsheet and database capabilities, it also lets you bring in and link information from dBase,* Lotus* 1-2-3,* Excel and other popular data and graphics programs.



Thinx Thinks Like You Do.

THINX CLEARLY: Thinx lets you draw, calculate, analyze, decide and present as easily as point and click.

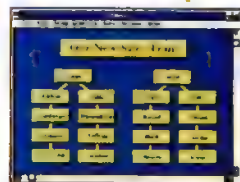
The purpose of Thinx is to perform easy "what-if" analyses. So, from the germ of an idea to the presentation of a proposal, Thinx thinks right along with you. With the simplicity of point and click, you can execute an idea by adding, deleting or moving images. Thinx automatically does all the calculations necessary to show you the results of your action. Examine an infinite number of options and, when you decide on your best one, Thinx will provide you with a dazzling presentation.



Configure a product or system. Thinx will show you how all the parts fit together.

THINX AGAIN: Thinx won't run out of applications until you run out of ideas.

Because Thinx thinks the way you do, its applications can be as personal as your own ideas. Thinx isn't limited to particular industries, environments or areas of specialization. Any time a problem can be depicted graphically, you have an application for Thinx. For details on our special introductory offer, call 1-800-688-4469. The first 1000 phone purchases will receive a free Microsoft® Windows Productivity Pack.



Thinx can show you how changing salaries and expenses can affect your company's overhead.

CIRCLE 471 ON READER SERVICE CARD

by
Fran Finnegan

Windows

UNINSTALLING WIN APPS— A CATCH-22

I've tried to install the runtime versions of ToolBook and DayBook, which came with my copy of *Windows* 3.0. The installation seemed to work fine, but I couldn't run DayBook. Instead, ToolBook gave me an error message.

I finally gave up and deleted all the ToolBook files to reclaim the space on my hard disk. But I couldn't stop *Windows* from displaying the message "Group File Error: Cannot open program group file 'C:\WINDOWS\TOOLBOOK.GRP.'" It comes up every time I start *Windows*. I even deleted the association statement in the WIN.INI file, but the message still comes up every time I start *Windows*. Could you tell me how to get rid of it? (I have a 20-MHz 80386 IBM-compatible, DOS 4.01, and a 60MB hard disk.)

Gerhilde Repnigg
Manitouwadge, Ontario, Canada

PC It's unfortunate that most applications come with only an install procedure and no uninstall feature. This common deficiency is compounded in *Windows*, where there are several not-so-obvious places you have to look in order to modify your configuration. Users must sometimes delete files, but they can easily miss hidden ones that the application used, or they may overlook references to the application's files that are buried in other files. The uninstall burden is also much greater in *Windows* than in DOS because *Windows* is an environment of connected objects.

Mrs. Repnigg attempted to uninstall ToolBook by deleting the TOOLBOOK.GRP file along with all the other ToolBook files. And this is the crux of her problem: TOOLBOOK.GRP is owned by the Program Manager and not by ToolBook.

A group consists of the icons and textual information that make up Program Group Properties and Program Item Properties, which are accessed by the File Properties

- **UNINSTALLING WIN APPS—A CATCH-22:** Deleting a Program Manager's Group file outside the Program Manager could back you into a corner.
- **THE HIMEM.SYS XMS TRAPDOOR:** Once you use an XMS extended memory manager, your applications will be able to access extended memory only through the XMS API.
- **UPDATING DEVICE DRIVERS:** If you're serious about *Windows*, be wary of lesser-known hardware vendors. A lower price is not worth a sacrifice in compatibility.

menu item. It is kept in a .GRP file. The Program Manager keeps track of the group files it owns in a file named PROGMAN.INI, which resides in the *Windows* subdirectory (usually C:\WINDOWS).

PROGMAN.INI contains a section named [Groups]. A group entry in this section looks something like

```
Group3=C:\WINDOWS\TOOLBOOK.GRP
```

If the Program Manager can't find a group file listed in PROGMAN.INI, it generates the error message described by Mrs. Repnigg.

In order to delete a group using Program Manager, thereby removing the group entry in PROGMAN.INI and erasing the .GRP file, you must be able to point to a group icon inside the Program Manager window. But if you've already deleted

the .GRP file referenced in PROGMAN.INI, there's no group icon available to point at. The Program Manager won't display an icon for a group whose group file doesn't actually exist.

So Mrs. Repnigg—and anyone else in her situation—is caught in what seems like a Catch-22: Once the .GRP file is deleted *outside* of Program Manager, there is no mechanism in Program Manager to remove the group file reference from its own list (in PROGMAN.INI)!

To solve this kind of problem, you must manually edit PROGMAN.INI. Using either Notepad or another text editor, you simply remove the offending group-file line and then resequence the group numbers, if necessary. By *resequence*, I mean that the [Groups] section of PROGMAN.INI should contain numerically sequential Group entries: Group1=..., Group2=..., Group3=..., and so on. The next time you start *Windows*, you won't have the recurring error message.

You should note that for this particular procedure, you can't use the System Configuration Editor (SYSEDIT.EXE) that comes with *Windows*, because SYSEDIT deals with only the CONFIG.SYS, AUTOEXEC.BAT, SYSTEM.INI, and WIN.INI files. These four filenames are hard-coded into SYSEDIT, so there is no way to configure it to handle other "system" files, such as PROGMAN.INI.

The following is my recommended strategy for removing *Windows* software, assuming an application does not have an uninstall option (and there are none that I am currently aware of):

Using Program Manager, either delete the individual application icon or minimize the entire group and then delete the group icon.

Using SYSEDIT or Notepad, edit WIN.INI to remove any sections or lines specific to the application.

Review your CONFIG.SYS and AUTOEXEC.BAT files for any application-specific entries that should be changed.

Using the File Manager, the MS-DOS

Windows

Executive, or DOS itself, delete the application's files and subdirectories.

THE HIMEM.SYS XMS TRAPDOOR

I own a new 25-MHz 80386 machine with 4MB of memory, *Windows* 3.0, and DOS 4.01. When I boot up the computer, go directly to the DOS prompt, and start *Framework III*, it runs just fine and has 2MB of memory available.

But when running *Framework* from within the *Windows* environment or after exiting *Windows*, I have only 154K of memory available, which effectively disables *Framework III*. Any ideas?

Bruce Thomas
Virginia Beach, Virginia



Without seeing his CONFIG.SYS file, I can only infer how Mr. Thomas's system is configured. But based on the behavior he describes, it would appear that his CONFIG.SYS file contains the line

Device=HIMEM.SYS

HIMEM.SYS is Microsoft's extended memory manager (XMM). XMMs implement the Extended Memory Specification (XMS) Version 2.0, developed by Lotus Development, Intel, Microsoft, and AST Research. The XMS lets DOS pro-

grams (including device drivers and *Windows*) use—in a consistent, machine-independent way—three classes of additional memory found in Intel 80x86-based machines: Upper Memory Blocks (UMBs), High Memory Area (HMA), and Extended Memory Blocks (EMBs).

Upper Memory Blocks, if present, are located within the 640K to 1MB real-mode address range. The number, size, and location of the UMBs vary widely, depending on the types of memory and adapter cards installed. The High Memory Area consists of the first 64K of extended memory beginning at the 1MB address point. The XMS permits real-mode DOS programs to access the HMA for code and data. Extended Memory Blocks, located above the HMA, begin at the 1MB-plus-64K (1,088K) address point. EMBs are addressable only in protected mode. Figure 1's memory map shows the relationship between these three classes.

HIMEM.SYS, Version 2.60, is installed as the first device driver in CONFIG.SYS by the *Windows* 3.0 Setup program (provided you have extended memory). It is an XMM that allows programs to access all available extended memory by using the XMS application program interface (API). *Windows* uses the XMS API for this purpose in Standard and 386 Enhanced modes, and this use of extended memory is completely transparent to *Windows* applications operating in these protected modes (so-called "breaking the 640K barrier"). The underlying use of the XMS is transparent to *Windows* programs because they

use the *Windows* API to access any and all available memory.

HIMEM.SYS (or any other XMM) must obviously be installed before any other device drivers that make API calls to it. Thus, any device drivers that make XMS API calls, such as SMARTDRV.SYS or RAMDRIVE.SYS, should be listed after HIMEM.SYS (or another XMM) in your CONFIG.SYS file.

The use of the XMS is a trapdoor proposition. In other words, once the XMS API is used to access extended memory, the XMS API becomes the *only* way to access extended memory. The XMS requires this so that extended memory can be governed and protected by the XMM.

When a device driver or program (such as *Windows*) uses the XMS API, the XMM wakes up and takes over all the extended memory DOS says exists. The XMM becomes the sole manager of that memory, and it does not relinquish control of it; any program that subsequently wants extended memory must use the XMS API to get it. *Framework*, however, does not currently use this API correctly, so it is not capable of accessing extended memory after another program has used the XMS API. When *Framework* then blindly asks DOS how much extended memory is available, the XMM intervenes and reports that none is available.

Given all of the above, one can infer that your CONFIG.SYS contains neither a SMARTDRV.SYS nor RAMDRIVE.SYS device; both of these device drivers use the XMS API. If *Framework* can initially access 2MB of memory, then the XMS API has not been used by any device drivers (such as SMARTDRV.SYS or RAMDRIVE.SYS) or DOS programs (such as *Windows*). But once you fall through the trapdoor by using *Windows*, subsequent programs are forced to go through the XMS API in order to get to extended memory. This rules out nonnetwork versions of *Framework*.

Framework must be modified to use the XMS API correctly for extended memory in order for it to be compatible in an XMS or *Windows* 3.0 environment. Until then, you're out of luck. In the meantime, you can remove HIMEM.SYS from your CONFIG.SYS to disable its management of extended memory, but this will force you to run *Windows* in Real mode. That's the trade-off.

For DOS programmers wishing to access Upper Memory Blocks, the High Memory Area, or Extended Memory Blocks

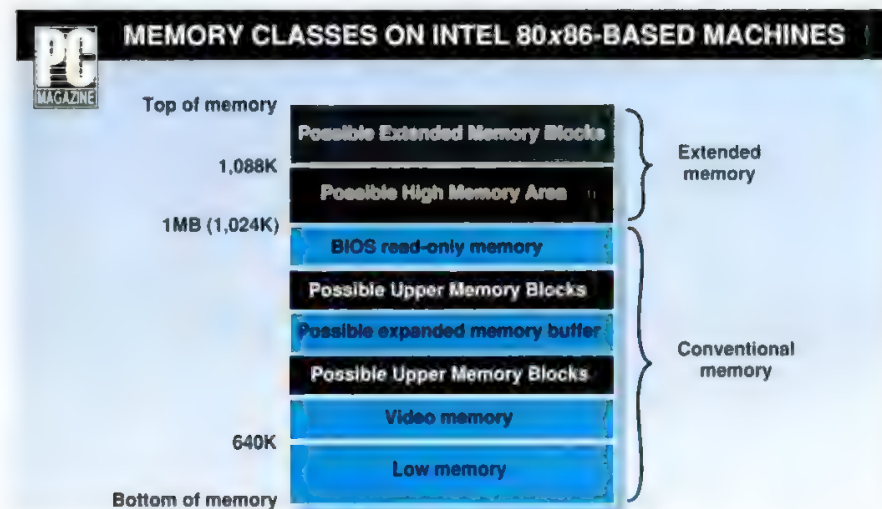


Figure 1: HIMEM.SYS manages any Upper Memory Blocks found in conventional memory and the High Memory Area and Extended Memory Blocks located in extended memory, all of which are shown, above, as shaded areas.



WHEN THE GOING GETS TOUGH, THE TOUGH GET FASTER.

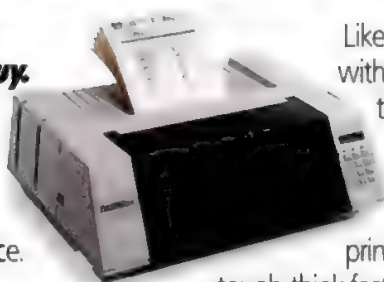
Introducing Performax™, the fastest, toughest forms printer money can buy.

Imagine a printer designed to print at lightning speeds on the toughest media around. Six-part forms. Stiff card stock. Bulky, adhesive-backed labels. All flying through at speeds up to 622 cps. Now that's performance. That's Performax, new from Datasouth.

Performax has what it takes to print forms quickly and easily. Features like a straight paper path to prevent bunching and jamming. Plus a zero tear off bar for demand document applications.

The front panel keypad stores up to four different print-profiles to switch instantly to a different style of form. And Performax shifts easily to feed cut sheet documents—parking and reloading continuous forms at the touch of a button.

Performax even prints bar codes and industrial graphics.



Like all Datasouth printers, Performax is built to withstand a round-the-clock duty cycle. All for less than the price of a low-end line printer. In short, Performax is the toughest, most versatile, high-speed forms printer around.

So if you're thinking about a forms printer, don't just think tough, think fast. Think Performax.

Call **1-800-476-2120** for more information.



Datasouth

AMERICA'S HIGH PERFORMANCE
PRINTER COMPANY

P.O. BOX 240947, Charlotte, NC 28224 • (704) 523-8500 • Tlx: 6843018 DASO UW • Sales: 1-800-476-2120 • Service: 1-800-476-2450

© 1991 Datasouth Computer Corporation. Performax is a trademark of Datasouth Computer Corporation.
CIRCLE 281 ON READER SERVICE CARD

Windows

through the XMS API, the Extended Memory Specification document is available at no cost from Microsoft. Call 800-426-9400 for details. The trapdoor mechanism is described under Implementation Notes for DOS XMS Drivers in bullet-points 3 and 4 on pages 3 and 4.

UPDATING DEVICE DRIVERS

I've found an interesting incompatibility problem with *Windows* 3.0. It will not work correctly with a Genoa Systems VGA card. *Windows* will start, but if you shell out to the DOS prompt and then try to return to *Windows*, the display is garbled. Apparently, it will not go back into the correct video mode after it has been put in character mode. I haven't been able to find many other users with a Genoa VGA card, but everyone I have talked to has this same problem. My Genoa card is not listed in the compatible hardware list that comes from Microsoft.

Knute Johnson
Sylmar, California



This is a problem shared by many *Windows* users. It all relates to hardware standards. Unless there is a *Windows* device driver designed specifically for your hardware (video adapter and monitor, keyboard, mouse, and so on) or one that is compatible with your hardware, you will have various problems with *Windows*.

When Microsoft, or any software developer for that matter, develops a product, standards play a distinct role. *Standards*, in this context, is another word for *market shares*. Microsoft develops and distributes device drivers with *Windows* for the devices that have earned the largest market shares. Beyond that, vendors with a smaller piece of the pie must themselves develop *Windows* device drivers for their products.

Sometimes those lesser vendors can convince Microsoft to squeeze their device drivers (if available) onto the retail *Windows* disks or onto the *Microsoft Windows* Supplemental Driver Library (SDL). The SDL is available for \$17.50 from Microsoft (800-426-9400).

Failing to convince Microsoft, the lesser vendor has to find a way of distributing

its *Windows* drivers independently. Some drivers will come with a vendor's product; others may be downloaded from a vendor's BBS or from CompuServe, PC MagNet, BIX, or GENie. What you have to do is contact the manufacturer and find out how you can get a driver for *Windows* 3.0 that supports your hardware.

Because I'm conservative, not wanting to risk the kinds of *Windows* problems such as the one you are facing here, my personal philosophy is to stick with the major brands for all hardware, even if it costs a bit more.

OPENING WINDOWS

Share your *Windows* experiences with *PC Magazine*; we'll pay you \$50 for any tip we print. Mail your contribution on a disk, together with a printout, to *Windows*, *PC Magazine*, One Park Avenue, New York, NY 10016, or e-mail them to:

PC MagNet: 76244,145

MCI Mail: Fran Finnegan

BIX: franfinnegan

GENie: finnegan

Internet: finnegan@well.sf.ca.us

(See page 8 for PC MagNet access instructions.)

Finding A Virus Can Be A Hare Raising Experience



Immunize your computer with Dr. Solomon's Anti-Virus Toolkit before they multiply, and multiply, and multiply...

Hop over to our booth
at Comdex! #4451

- ▶ Inoculates, Eradicates, Annihilates
- ▶ Checks For Over 350 Viruses - 100 More than the Closest Competitor - in Less Time!
- ▶ Includes Network Support
- ▶ Detects Duplicate Infections
- ▶ FREE Year of Quarterly Upgrades
- ▶ V.I.P. Monthly Service Available
- ▶ Backed by Ontrack Technical Support

Just \$279.95 safeguards you with a collection of anti-virus programs. Call today.

1-800-752-1333

International: 612-937-1107 • Fax: 612-937-5815
6321 Bury Drive, Eden Prairie, MN 55346

Ontrack
COMPUTER SYSTEMS

Exclusive North American Distributor

~~This sentence~~ is unreadable to every OCR software package. Except one.

Only OCRON's Perceive™ 1.1 teams two OCR technologies—a unique learning engine and powerful omnifont recognition—to deliver maximum OCR productivity. Omnifont simply can't read everything. But now, what it can't read—like odd typefaces, special symbols, and ill-defined characters—the learning engine does. And after only two or three minutes of “learning,” not hours of “training.”

Depending on specific OCR needs, you can use: (1) *omnifont only*, (2) *omnifont with learning* to “tailor” the OCR reading vocabulary, or (3) *learning only* for reading otherwise “impossible” documents which, with problem typefaces or photocopy blur, typically require typing.

It's the result of Adaptive Character Recognition,™ a breakthrough OCRON technology that boosts recognition accuracy and learning speed, yet uses less memory. And it reflects the kind of thinking that's given Perceive 1.1 other performance features, like the industry's fastest software-only omnifont, automatic detection and recognition of dot matrix print, and automatic separation of text columns and graphics.

**Omnifont OCR—and more—
for handscanners**

In handscanner OCR software,
OCRON's Perceive Personal Version 1.1

also sets new standards. Blending omnifont's accuracy and speed with the ability to recognize full pages of text, it's quickly become the choice of leading handscanner manufacturers.

With Microsoft® Windows compatibility, both Perceive 1.1 and Perceive Personal 1.1 are easily used on 286 or 386 PCs. They're highly affordable, need only 2 megabytes of memory, require no additional hardware, and give you broad choice in flatbed and handscanners.

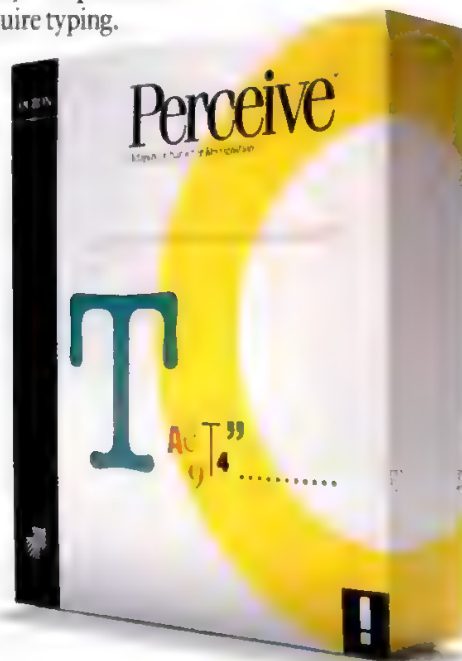
Better write or
phone UIMAGE,
the OCRON
direct marketer,
for details.
And learn
how, in OCR, we're
bringing new meaning to accurate
“speed reading.”

OCRON, INC.

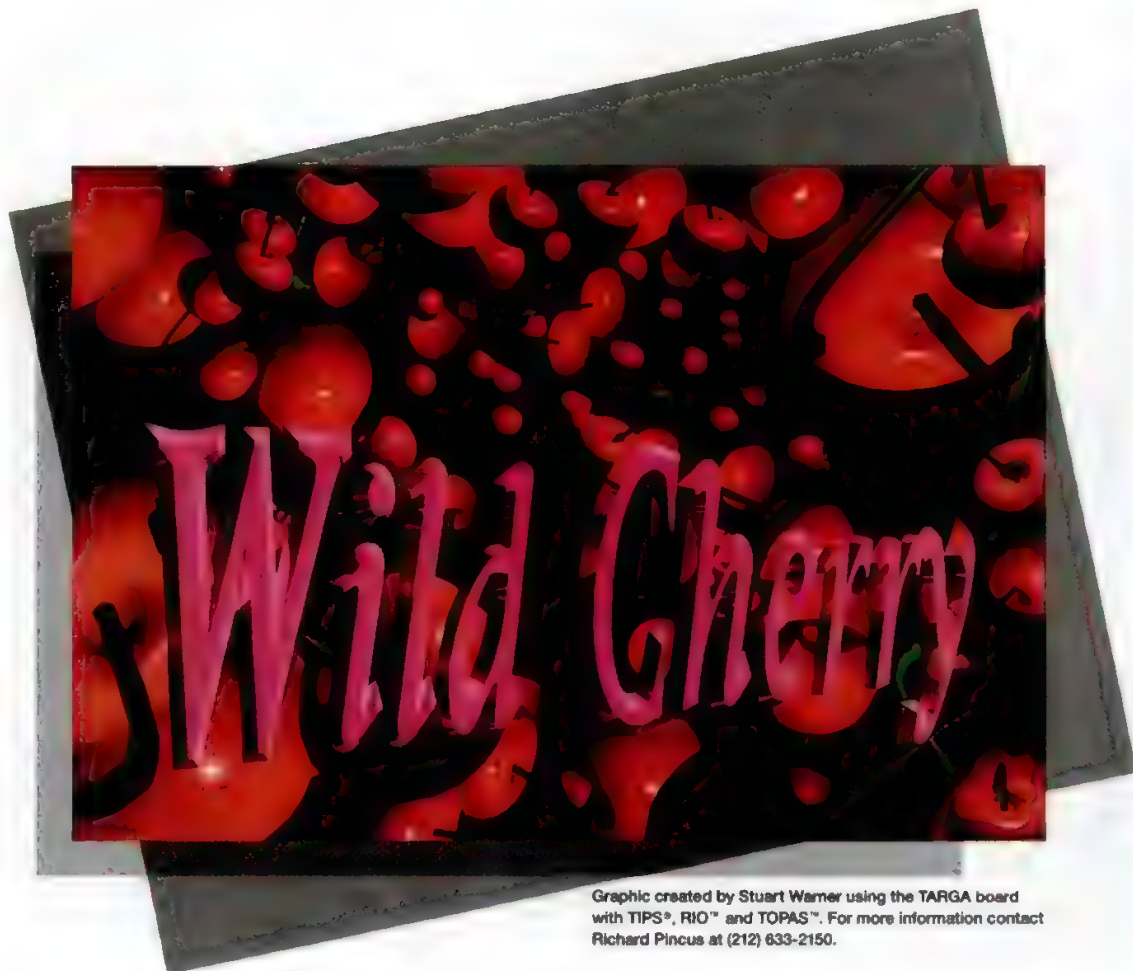
DISTRIBUTED BY:

UIMAGE

6055 E. Washington Blvd., Suite 730
City of Commerce, CA 90040
Tel. (213) 888-0810
(800) 800-4846



"Time is money and
I'm saving both with TARGA."



Graphic created by Stuart Warner using the TARGA board with TIPS®, RIO™ and TOPAS™. For more information contact Richard Pincus at (212) 633-2150.

And the new TARGA+ does even more. Our updated version has special effects you just can't find on any other board. Use the digital linear keyer to create new transitions, like fades and blended overlays. Or use the digital chroma keyer to superimpose live video on a computer generated background. With TARGA+, business graphics have never been tastier.

Introducing the Truevision TARGA+. The next generation TARGA for the next generation TARGA user.



TRUEVISION®
Providing Solutions With Vision™

CIRCLE 515 ON READER SERVICE CARD

7340 Shadeland Station, Indianapolis, IN 46256
INTERNATIONAL: Canada 416/940-8727 France 33-1-3-952-6253 Italy 39-2-242-4551
Switzerland 41-1-825-0949 U.K. 44-628-77-7800 West Germany 49-89-812-0010 Other 617/229-6900
RIO and TOPAS are trademarks of AT&T.



Richard Pincus
State of the Art
Productions
New York, New York

With TARGA+, we can create high-quality business presentation graphics in a fraction of the time it would take using another product. And, at a fraction of the cost. Truevision's TARGA is the smart way to do business.

Call
800-44-TRUE
For more information

by
Sal Ricciardi

Databases

DYNAMIC GROUPING IN FOXPRO REPORTS

I've found a handy way to use one report form to produce several reports, each grouped differently.

FoxPro's report writer lets you group data on the basis of a field or expression. For example, if your database contains a field named Region, you can produce a report that lists sales by region with subtotals for each region. You can also create special regional headers and footers and even generate page breaks when the region changes. All you have to do is specify Region as a group expression in the report form. For this to work correctly, the data must be ordered by region; either physically, as when the file is sorted by region, or via an active index file.

But what if you want to use the same re-

■ **DYNAMIC GROUPING IN
FOXPRO REPORTS:** How
to generate many reports
from just one report form.

■ **MACRO SUBSTITUTION
IN DBASE IV REPORTS:**
The FLDGET function can
trick dBASE IV's report
generator into accepting
macro substitution in
calculated fields.

port format for sales by product? First, you'll have to order the database by product. Then, you'll have to change the group expression in the report form from Region to

Product. This means a new report form, or does it?

The program in Figure 1 uses the same report form to produce four different reports. Two sample reports are shown in Figure 2. The program works by changing the group expression to one of the four active index key expressions on the fly.

First, a POPUP is defined to present a menu of the four report choices. Each BAR of the POPUP corresponds to one of the open index files, and the BARs are defined in the same order as the open indexes. That is, BAR 1 corresponds to the first index specified by the USE command, BAR 2 corresponds to the second, and so on.

When a choice is made from the POPUP, the BAR() function is used to return the number of the selection. Since this corresponds to the active index order, a

POPUPREPT.PRG

COMPLETE LISTING

```
.....
* Program: POPUPREPT.PRG
* System: Example, Dynamic Definition of Report Groupings
*
* Function: Reptgroup()
* Rept Form: Salesrpt.FRX
* Data: SALES.DBF (struct & index keys below)
*.....

* Structure for database: H:\SALES.DBF
* Number of data records: 11
* Date of last update : 12/18/90
* Field Field Name Type Width Dec
* 1 ORDER NO Character 8
* 2 DIVISION Character 10
* 3 REGION Character 2
* 4 ORDER DATE Date 8
* 5 QUANTITY Numeric 10
* 6 PRODUCT Character 10
* ** Total ** 49

CLEAR ALL
CLOSE ALL
SET SAFETY OFF
SET TALK OFF

* Open the database and associated index files, ordinarily:
* USE sales INDEX evolume, sregion, sdivision, sproduct

* In this example we'll create the index files now:

USE sales
INDEX ON STR(quantity,10,0)+DTOS(order_date) TO evolume
INDEX ON region+DTOS(order_date) TO sregion
INDEX ON division TO sdivision
INDEX ON product+order_no+STR(quantity,10,0) TO sproduct

SET INDEX TO evolume, sregion, sdivision, sproduct

* Define the popup:

DEFINE POPUP reports FROM 1,20 SHADOW
DEFINE BAR 1 OF reports PROMPT "Sales By \<Volume "
DEFINE BAR 2 OF reports PROMPT "Sales By \<Region "
DEFINE BAR 3 OF reports PROMPT "Sales By \<Division "
DEFINE BAR 4 OF reports PROMPT "Sales By \<Product "
```

```
* Note that the BARs are defined in the
* SAME ORDER as the index files were opened!

* Complete your POPUP definition with this command:
ON SELECTION POPUP Reports DEACTIVATE POPUP

* Now, here's the routine that calls the REPORT FORM:

DO WHILE .T.
* First, get the user's selection:
ACTIVATE POPUP REPORTS

IF BAR() = 0 .OR. LASTKEY() = 27
* we didn't get a selection; ESC or right or
* left arrow was pressed
EXIT
ENDIF

SET ORDER TO BAR()
* now we've got our grouping order

* create a title
mtitle = "This report shows "+ALLTRIM(PROMPT())+"."

* construct the group expression
mgroup = LEFT(KEY(BAR()), AT("+",KEY(BAR()),1)-1)

IF LEN(mgroup) = 0
* if there wasn't an appropriate "+" in the
* index expression
mgroup = KEY(BAR())
ENDIF

REPORT FORM salesrpt &6 with whatever clauses you need

ENDDO
RELEASE POPUPS
RELEASE ALL
CLOSE ALL
RETURN

*****

FUNCTION Reptgroup
PARAMETERS getgroup
RETURN &getgroup
```



Figure 1: This sample program illustrates how to use a single common report form to produce several reports, each grouped on a different expression.

Databases

POPREPT OUTPUT

This report shows Sales By Product.

Sales By Product for:	COAT				
Order #	Division	Region	Order Date	Quantity	Product
10000015	DOGWEAR	SE	01/11/90	200	COAT
Total Volume:				200	

Sales By Product for:	COLLAR				
Order #	Division	Region	Order Date	Quantity	Product
10000014	DOGWEAR	SE	11/30/90	10	COLLAR
10000016	DOGWEAR	NE	02/28/90	3	COLLAR
10000018	WIDGETS	NW	08/11/90	10	COLLAR
Total Volume:				23	

Sales By Product for:	FRAMLET				
Order #	Division	Region	Order Date	Quantity	Product
10000010	WIDGETS	NE	11/07/90	3	FRAMLET
10000019	DOGWEAR	NW	07/11/90	200	FRAMLET
Total Volume:				203	

This report shows Sales By Region.

Sales By Region for:	NE				
Order #	Division	Region	Order Date	Quantity	Product
10000016	DOGWEAR	NE	02/28/90	3	COLLAR
10000018	WIDGETS	NE	11/07/90	3	FRAMLET
Total Volume:				6	

Sales By Region for:	NW				
Order #	Division	Region	Order Date	Quantity	Product
10000019	DOGWEAR	NW	07/11/90	200	FRAMLET
10000018	WIDGETS	NW	08/11/90	10	COLLAR
Total Volume:				210	

Sales By Region for:	SE				
Order #	Division	Region	Order Date	Quantity	Product
10000015	DOGWEAR	SE	01/11/90	200	COAT
10000014	DOGWEAR	SE	11/30/90	10	COLLAR
Total Volume:				210	

Figure 2: Here are two sample reports produced using the program and report form specified in Figure 1. The first report is grouped by item, the second shows the same data grouped by region.

SET ORDER TO BAR() command orders the database appropriately for the chosen report. Then, a combination of the BAR(), AT(), and KEY() functions is used to construct the group expression from the key expression of the chosen index.

To provide the report writer with the group expression, a UDF (user-defined function) is used. The UDF references the variable that contains the group expression (mgrou in the example) like this:

Reptgroup(mgroup)

You place the above line in the report form as the group expression. Figure 3 shows

the report writer layout for a sample report.

The UDF must be available to your report form, either in the same .PRG that calls the report or in an active procedure file. The UDF itself simply contains

```
FUNCTION Reptgroup
PARAMETERS getgroup
RETURN &getgroup
```

Reptgroup() evaluates the group expression and returns its contents to the report writer. It's required, because the report writer will not work correctly with macro substitution (the &getgroup) in a group expression.

That's all there is to it! You can make this process even more generic if you have several databases with the same structure, by removing any alias information from the report form (.FRX). One report form can serve quite a few purposes for you.

Lisa C. Slater
Santa Rosa, California

PC MAGAZINE FoxPro's documentation refers to the group expression as a *control break* expression, since a change in the value of the expression causes a control break—group footers are printed and then a new group is started, with optional group headers and so forth.

Duplicating report forms just to change the group expression is cumbersome and increases the number of files you'll need to distribute with your application. Ms. Slater's useful technique lets you avoid this inconvenience, as long as the overall design of your report doesn't change along with the group expressions.

The POPREPT example program demonstrates just how easy it is to produce the same report grouped differently by any of the active index-key expressions.

MACRO SUBSTITUTION IN DBASE IV REPORTS

I have found the report generator in dBASE IV 1.1 to be an extremely powerful tool. However, there is one apparent limitation: it will not accept a macro substitution (&) in a

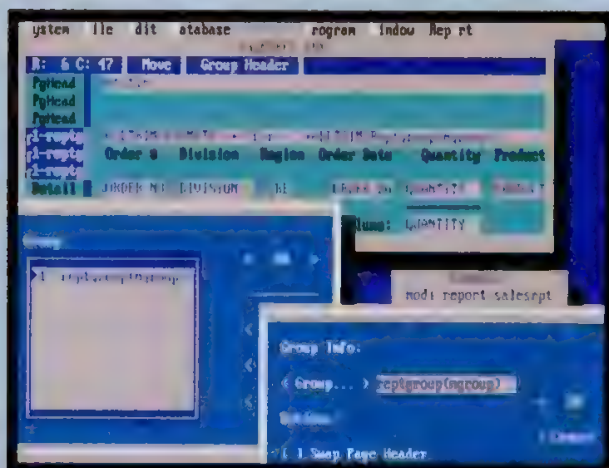


Figure 3: With FoxPro's report writer, you can use a user-defined function in the Group Dialog, as shown here, to let you change the group expression on the fly.

Databases

calculated field. To solve this problem, I run a program that contains the function FLDGET, as follows:

```
FUNCTION FLDGET  
  PARAMETER fldname  
  RETURN &fldname
```

I've found that if you run a program containing this function before you enter the report generator, you can insert the expression FLDGET(mem_var) into a calculated field. In the expression mem_var is a character memory variable that holds a valid field name in the currently open database. The report generator will properly evaluate the expression as &mem_var.

If you need to use this function often, you can create a program FLDGET.PRG. It must have the same name as the function and it must have one line of code besides the function (such as X=0). Otherwise, you'll get a compiler error. As long as the compiled version (FLDGET.DBO) is in the current directory, dBASE will recognize the

POPREPT.PRG

**demonstrates just how
easy it is to produce
the same report
grouped differently by
any of the active index-
key expressions.**

function, even if you don't run the program each time you enter dBASE.

Charlie Weissman
Oceanside, New York



Getting dBASE IV's report writer to accept the user-defined function FLDGET(memvar) in a calculated field is tricky when you first attempt it. The function must already exist in an open procedure file, and the variable memvar

must exist and contain the name of a field in the currently open database or another memory variable. This will trick the report writer into accepting the function.

Thankfully, the expression is evaluated correctly at runtime. This means you can use a UDF to let you change the report expression anytime; because of this added flexibility, you can explore techniques similar to what Lisa Slater presented in "Dynamic Grouping in FoxPro Reports" above (which can be converted to dBASE IV fairly easily).

LET US HEAR FROM YOU

Share your database experiences, tips, and techniques; we'll pay you \$50 for any submission we print. Submissions can be mailed to our office or uploaded to PC MagNet. Mailed submissions must be made on-disk, accompanied by a printout, and sent to Databases, *PC Magazine*, One Park Avenue, New York, NY 10016. To upload your contribution to PC MagNet, see the PC MagNet News page following the Utilities column for access instructions. You may also contact Sal Ricciardi directly via his CompuServe ID number: 72241,33. ■

DON'T GIVE MONEY TO STRANGERS.

Before you give to a heart organization, make sure it's one you trust: The American Heart Association. Since 1924 we've sponsored lifesaving education programs and funded \$900 million in research. Others may copy us, but they can't hold a candle to our heart and torch. To learn more, contact the American Heart Association, 7320 Greenville Ave., Box 20, Dallas, TX 75231.

You can help prevent heart disease. We can tell you how.



American Heart Association

This space provided as a public service.

WordScan™ The Most Accurate OCR You Can Buy.

And We'll Prove It.

ognition we build into our hig
ces. Our unique **pop-up** editor
sults in
e cha ca
o the An
narie ie
ther OCR products. You can eve
o it accurately recognizes un

pop-up

Our unique Pop-Up Verifier™ guarantees the most accurate results possible. Proof twice as fast without referring to the original document.

We started with the lowest error-rate OCR technology in the industry. Then we added exclusive features to make WordScan even more accurate. With WordScan you get the same state-of-the-art recognition we build into our high-end systems, at desktop prices.

Powerful features make WordScan even more accurate.

Our unique *Pop-Up Verifier* guarantees the most accurate results possible. It pops up an enlarged image of any questionable character or word so you can proof without referring to the original document.

And because WordScan uses dictionaries during recognition, we don't make mistakes common to other OCR products. You can even add your

**"WORDSCAN PLUS
REDEFINES WHAT WE EXPECT
FROM AN OCR PACKAGE. ITS
EXCEPTIONAL ACCURACY, WEALTH
OF FEATURES, AND HANDS-OFF
DESIGN SET A
NEW STANDARD."
—PC MAGAZINE**



own words so WordScan accurately recognizes unusual or specialized terms.

Zap figures or text right from a fax card to your word processor or spreadsheet. No fuzzy print-outs. No retyping. No errors. And only WordScan has built-in dot-matrix support to read even draft quality dot-matrix documents *accurately*. Most OCR products can't do this at all or charge you extra.

Other unique WordScan features get the job done faster, better.

Clipping, another WordScan timesaver, lets you choose just what you want on

the page. Text, image, or both. All in one pass.

Deferred Processing™ lets you scan large documents now, but do OCR later so your PC is not tied up.

Make different documents look the same with our exclusive *Style Sheet* feature.

Process multiple documents into separate files automatically. Just put a blank page between documents and WordScan does the rest.

We'll send you the proof.

To see the results of head-to-head, real-world comparison tests with the leading competitive OCR software products, or to get the name of a dealer where you can make the comparisons yourself, just give us a call at 800-544-7051.



CALERA
RECOGNITION SYSTEMS

CIRCLE 522 ON READER SERVICE CARD

2500 Augustine Drive, Santa Clara, CA 95054 USA. 800-544-7051; outside USA, 408-986-8006; FAX 408-986-1440

© 1991 Calera Recognition Systems, Inc. Calera® is a registered trademark of Calera Recognition Systems, Inc. WordScan, PopUp Verifier and Deferred Processing are trademarks of Calera Recognition Systems, Inc.

by
Craig Stinson

Spreadsheets

A POP-UP CALENDAR IN 1-2-3

Occasionally, I need to look at a calendar while working in *Lotus 1-2-3*, so I wrote the macro listed in Figures 1 and 2. You simply press Alt-C, and the current month's calendar pops up in inverse video at the center of the screen. Pressing the Up or Down Arrows will move the calendar forward or back a month at a time, and pressing PgUp and PgDn will move it forward or back a year at a time. When you press F5, the macro lets you select a year. Pressing the Plus key presents a calendar for January of the year currently displayed, and pressing Esc or Return removes the calendar and takes you back to your spreadsheet. The calendar itself is shown in Figure 3.

R. A. McCormack
Thunder Bay, Ontario, Canada



This macro is both useful and instructive. Its main business is to display a worksheet range, called CALDISPLAY, in which numbers and labels are laid out in the form of a calendar. This task is accomplished by the macro instructions in A1..B29 (Figure 1). The calendar itself is generated by the worksheet formulas listed in Figure 2.

The macro starts by turning off the window, panel, and border display. The statement in B4 creates the range name HERE and then assigns that name to the current cell. This way, when you've finished looking at the calendar, the macro can take you back to where you were when you popped up the calendar.

The code in B5 takes the cell pointer to the upper-left corner of CALDISPLAY. This named range encompasses the calendar itself, the keystroke instructions that appear under the calendar, and some empty rows and columns. The empty rows and columns frame the calendar and cause it to be centered on your screen. The sequence

```
{End}{Home}{Bigright}{PgDn}{Goto}  
CALDISPLAY
```

■ A POP-UP CALENDAR IN 1-2-3: A macro-generated calendar lets you scan any month in the 20th or 21st centuries.

in the B5 cell may seem like a rather circuitous route to CALDISPLAY, but it ensures that the {Goto} instruction will plant the upper-left corner of CALDISPLAY in the upper-left corner of your screen.

At this point, the calendar is still not visible (despite the {Goto} instruction in B5), because the earlier {Windowsoff} command has suppressed screen update. The code in cell B7 will make it visible. But first, the macro needs to initialize the calendar so that it can display the current

month. The instruction in cell B6

```
{Let DDATE,@Date(@Year(@Now),  
@Month(@Now),15)}
```

takes care of that detail. It assigns the 15th of the current month to a cell named DDATE. Later, we'll see how assigning that date to DDATE enables the calendar to display the current month.

Next, in B7, the macro uses a bit of subterfuge to highlight that portion of CALDISPLAY that actually contains the calendar. The nine rows and seven columns that make up the calendar are named HILITE. The instruction

```
/dF
```

initiates a /Data Fill command. 1-2-3 prompts for a fill range (invisibly, because of the earlier {Paneloff Clear} instruction), and the macro supplies the range name HI-

POPCAL.WK1		COMPLETE LISTING	
A	B		
1	\c	{Let BORDERS,"{Windowsoff}{Paneloff}"}	
2		{Ifkey Help}{Let BORDERS,"{Windowsoff}{Bordersoff}{Paneloff Clear}"}	
3	BORDERS	{Windowsoff}{Bordersoff}{Paneloff Clear}	
4		/rncHERE"/rncHERE"/rncHERE"/	
5		{End}{Home}{Bigright}{Pgdn}{Goto}CALDISPLAY"	
6	LOOP1	{Let DDATE,@Date(@Year(@Now),@Month(@Now),15)}"	
7	LOOP	/dFHILITE{Windowsoff}{Esc}	
8		{Windowsoff}{Get KEY}{Esc 4}	
9		{If KEY="{Esc}"}{Goto}HERE{Quit}	
10		{If KEY="{Home}"}{Goto}HERE{Quit}	
11		{If KEY="{Up}"}{Branch LOOP1}	
12		{If KEY="{Down}"}{Let DDATE,DDATE+365/12}{Branch LOOP}	
13		{If KEY="{Pgdn}"}{Let DDATE,DDATE-365/12}{Branch LOOP}	
14		{If KEY="{Pgup}"}{Let DDATE,DDATE+365.25}{Branch LOOP}	
15		{If KEY="{Query}"}/ppr{Esc}PRINTCAL"agg"q{Branch LOOP}	
16		{If KEY="{Goto}"}/ppr{Esc}PRINTCAL"agg"q{Branch LOOP}	
17		{Let DDATE,@Date(GOYEAR,GOYEAR,15)}{Branch LOOP}	
18		{If KEY="{+}"}{Let DDATE,@Date(@Year(DDATE),1,15)}	
19		{Branch LOOP}	
20			
21	GOYEAR		
22	GOYEAR	@IF(GOYEAR>100,GOYEAR-100,GOYEAR)	
23	KEY		
24			
25	DDATE		
26	DAY1ST	@DATE(@YEAR(\$DDATE),@MONTH(\$DDATE),1)	
27	MOD1STDAY	@MOD(DAY1ST,7)	
28	LASTDAY	+DAY1ST+32-@DAY(DAY1ST-32)	
29	NNWORDS	@CHOOSE(@MONTH(DAY1ST)-1,"January","February","March","April"	

Figure 1: The main part of the POPCAL macro sets up the range in which the calendar will appear and takes care of changing the calendar in response to menu commands.

Spreadsheets

LITE and issues a carriage return. Now, *1-2-3* prompts (still invisibly) for a starting number for the data-fill operation, proposing 0 as a default start value. At this point, the macro executes a {Windowson} command and sends an Esc key. The {Windowson} reenables screen updating, and the {Esc} sends *1-2-3* back one step in the /Data Fill prompt sequence. The net effect is that *1-2-3* highlights and displays Mr. McCormack's calendar.

Now that the calendar is visible, the macro can turn screen update off again—which it does with the {Windows-off} instruction at the beginning of B8. This doesn't remove the calendar from view; it just freezes the display so that the next instruction, {Esc 4}, can clear the /Data Fill routine without removing the highlight from your calendar.

The last instruction in B8, {Get KEY}, puts the macro in a holding pattern until you press a key. When you press a key, your keystroke is recorded in a cell named KEY, and the macro moves on to the series of {If} statements in B9..B18.

In B9, the macro first checks to see if

you pressed Esc; if you didn't, the remaining instructions in B9 are ignored, and the macro moves on to B10, where it checks to see if you pressed Enter. This process continues until one of the {If} statements generates a True result, whereupon the remaining code on the same line as that {If} statement is executed.

If the key you press is not one tested for in B9..B18, execution falls through to B19, which sends the macro back to its /Data Fill maneuver in B7. Thus, if you press an unsupported key or no key at all, the calendar remains on-screen.

If the key you press is Escape, Enter, or ~, the macro does a {Goto} to the range HERE and quits. Screen updating, panel display, and border display are automatically restored, and you're right back where you were when you pressed Alt-C.

If you press Up or Down, the macro adds or subtracts a month's worth of days to DDATE, causing the calendar display to advance or retreat appropriately. Similarly, if you press PgUp or PgDn, DDATE is incremented or decremented by 365.25, and the calendar moves forward or back one year. If you press Plus, the macro changes DDATE to the 15th of January in DDATE's current year. This year may not be the *actual* current year. If the

calendar displays 1999, for example, pressing the plus key displays January 1999, not January 1991.

If you press F5 (Goto), the macro prompts for a year. If your calendar displays June 1991, for example, and you press F5, 97, Enter, the calendar jumps to June 1997. In order to achieve this jump, the {Getnumber} instruction in B16 assigns your year-number entry to the cell GOYEAR. Directly below that cell, in the cell GOYEARC, the formula

@IF (GOYEAR>100,GOYEAR-1900,GOYEAR)

strips 1900 from your year number, if that number is larger than 100. The {Let} instruction in B16 then uses the value in GOYEARC to update DDATE, letting the calendar display the year you requested. The formula in GOYEARC allows the macro to accept 21st-century years.

All of the calendar-changing keystrokes so far (Up, Down, PgUp, PgDn, and +) send macro execution back to B7 (LOOP) after changing DDATE. The next supported keystroke, Home, returns control to B6, which reinitializes DDATE to the current month. Once this has been done, execution proceeds at B7, the original

```

CALENDAR LABELS AND FORMULAS

H38: [W7] '<<<<<<<<'
I38: [W7] '<<<'
J38: [W7] '+$MWORDS'
L38: [W7] @STRING(YEAR(DAY1ST)+1988,0)
M38: [W7] ' >>>>'
N38: [W6] '>>>>>>'
H39: U [W7] "Sun
I39: U [W7] "Mon
J39: U [W7] "Tue
K39: U [W7] "Wed
L39: U [W7] "Thu
M39: U [W7] "Fri
N39: U [W6] "Sat
H40..H49: U [W7] "-----
H41: [W7] @IF($MOD(ISTDAY=1,1,"")
I41: [W7] @IF(H41>8,H41+1,@IF($MOD(ISTDAY=2,1,""))
J41: [W7] @IF(I41>8,I41+1,@IF($MOD(ISTDAY=3,1,""))
K41: [W7] @IF(J41>8,J41+1,@IF($MOD(ISTDAY=4,1,""))
L41: [W7] @IF(K41>8,K41+1,@IF($MOD(ISTDAY=5,1,""))
M41: [W7] @IF(L41>8,L41+1,@IF($MOD(ISTDAY=6,1,""))
N41: [W6] @IF(M41>8,M41+1,@IF($MOD(ISTDAY=7,1,""))
H42: [W7] +H41+1
I42: [W7] +H42+1
J42: [W7] +I42+1
K42: [W7] +J42+1
L42: [W7] +K42+1
M42: [W7] +L42+1
N42: [W6] +M42+1
H43: [W7] +H42+1
I43: [W7] +H43+1
J43: [W7] +I43+1
K43: [W7] +J43+1
L43: [W7] +K43+1
M43: [W7] +L43+1
N43: [W6] +M43+1
H44: [W7] +H43+1
I44: [W7] +I44+1
J44: [W7] +J44+1
K44: [W7] +K44+1
L44: [W7] +L44+1
M44: [W6] +M44+1
H45: [W7] @IF(H44>@DAY(LASTDAY),"",@IF(H44<1,"",H44+1))
I45: [W7] @IF(H45>@DAY(LASTDAY),"",@IF(H45<1,"",H45+1))
J45: [W7] @IF(I45>@DAY(LASTDAY),"",@IF(I45<1,"",I45+1))
K45: [W7] @IF(J45>@DAY(LASTDAY),"",@IF(J45<1,"",J45+1))
L45: [W7] @IF(K45>@DAY(LASTDAY),"",@IF(K45<1,"",K45+1))
M45: [W7] @IF(L45>@DAY(LASTDAY),"",@IF(L45<1,"",L45+1))
N45: [W6] @IF(M45>@DAY(LASTDAY),"",@IF(M45<1,"",M45+1))
H46: [W7] @IF(N45>@DAY(LASTDAY),"",@IF(N45<1,"",N45+1))
I46: [W7] @IF(H46>@DAY(LASTDAY),"",@IF(H46<1,"",H46+1))
H47: [W7] \=
I47: [W7] \=
J47: [W7] \=
K47: [W7] \=
L47: [W7] \=
M47: [W7] \=
N47: [W6] "-----
H48: [W7] '||||'
I48: U [W7] '<Up>'
J48: [W7] 'Next Month'
L48: U [W7] '~+'
M48: [W7] 'January'
N48: [W6] '||||'
H49: [W7] '||||'
I49: U [W7] '<Down>'
J49: [W7] 'Last Month'
L49: U [W7] '<F5>'
M49: [W7] 'Goto yr'
N49: [W6] '||||'
H50: [W7] '||||'
I50: U [W7] '<PgUp>'
J50: [W7] 'Next Year'
L50: U [W7] '<F7>'
M50: [W7] 'Print'
N50: [W6] '||||'
H51: [W7] '||||'
I51: U [W7] '<PgDn>'
J51: [W7] 'Last Year'
L51: U [W7] '<Esc>'
M51: [W7] 'Exit'
N51: [W6] '||||'
H52: [W7] '||||'
I52: U [W7] '<Home>'
J52: [W7] 'Current Month'
L52: U [W7] '<Enter>'
M52: [W7] 'Exit'
N52: [W6] '||||'
H53..H53: [W7] \=
M53: [W6] "-----

```

Figure 2: The code above creates the pop-up calendar itself. You should make each entry in the cell indicated.

TECHNOLOGY: IT'S ALL IN THE ATTITUDE.

True Color By Cardinal

We share your attitude about technology.

If it doesn't satisfy your needs or make what you do better, why use it? Cardinal gives you the tools to create and display your vision, exactly the way you want it.

We produce original technologies that deliver beyond your expectations.

All Cardinal Series 700 VGA cards use superior technology, but with the VGA732 you'll get an even better look. You see the difference of crisp TARGA®-like photographic quality images at a fraction of the price. Experience brilliant 800 x 600 resolution with 32,768 *simultaneous*, on-screen colors. Call-up TARGA image files with our TrueView™ utility. Or, see 16-bit True Color in Windows®.

Proven technology. Original designs. Superior performance. Made in our own factory right here in the USA. They're all part of the Cardinal attitude.

For more information about Cardinal's full line of VGA graphics cards, or any of our other computing products, call your local dealer or (800) 233-0187 today.

Art Director

Scuba Enthusiast

Shows true colors whenever possible.

Cardinal VGA card user.

	VGA732	VGA700/100
High speed, high performance video controller	yes	yes
Expanded on-board video memory	1MB	1MB
16-bit True Color graphics	yes	—
800 x 600 x 32,768 colors	yes	—
1024 x 768 x 256 colors	yes	yes
TrueView™ Utility*	yes	—
Windows® 3.0 driver	yes	yes
8514/A driver	yes	yes
Selectable monitor type†	yes	yes
PRICE	\$299	\$249

*Lets you display TARGA image files.

†Interlaced or non-interlaced.

*VGA700 also available with 512K and 256K memory configurations.



Where Originality In Technology Begins.

1827 Freedom Road, Lancaster, PA 17601
(800) 233-0187 or (717) 293-3000

See us at booth #1322

COMDEX '91
The World's Leading Computer Trade Show for Dealers and End-Users

at SPRING
May 20-23, 1991 • Atlanta, Georgia

CIRCLE 319 ON READER SERVICE CARD

All names, products and services mentioned are the trademarks or registered trademarks of their respective organizations.

Spreadsheets

calendar is redisplayed, and so on.

The last keystroke, F7, sends 1-2-3 a sequence of commands that produces a printout of the current calendar.

Now let's look at the calendar itself.

To display the correct month name and to get the appropriate dates under the appropriate weekday headings, Mr. McCormack's calendar relies on information contained in five named cells: DDATE, DAY1ST, MOD1STDAY, LASTDAY, and MNWORDS. DDATE, cell B25, contains a constant supplied by the {Let} instruction in B6. The other four cells, B26..B29, are derived from DDATE. Figure 1 shows the formulas for DAY1ST, MOD1STDAY, LASTDAY, and MNWORDS in text format. This is the code you should type in; it is not the result displayed by each formula.

DDATE, you'll recall, is set initially to the 15th of the current month. DAY1ST's formula returns the first of DDATE's month. The formula in MOD1STDAY,

```
@MOD (DAY1ST, 7)
```

returns a number that the calendar will use to determine which day of the week the current month begins on. (If MOD1STDAY is 0, the first day of the month is a Saturday; if 1, it's a Sunday, and so on.)

LASTDAY returns the last day of the current month by adding 32 to DDATE and then subtracting the day value of the result. For example, if DDATE is February 15, 1991, then DDATE plus 32 is

March 19, 1991. Subtracting 19 from March 19 yields February 28. Finally, MNWORDS returns the name of the current month, by using @MONTH(DAY1ST)-1 as an index value for an @CHOOSE formula.

Meanwhile, the calendar itself uses a simple reference to MNWORDS to display the name of the month. Beneath this month heading and a row of weekday names is a five-row-by-seven-column block of formulas that generate day numbers. In H41, the upper-left corner cell, the formula

```
@IF ($MOD1STDAY=1, 1, " ")
```

checks to see whether the first day of the month is a Sunday. If it is, a 1 is displayed; otherwise, the cell displays nothing. Immediately to the right of this cell, in I41, the formula

```
@IF (H41>0, H41+1, @IF ($MOD1STDAY=2, 1, " "))
```

checks to see if H41 is displaying a number (H41>0). If it is, then we already know where the first day of the month falls, and all I41 has to do is increment H41. If H41 is blank, I41 runs another test of MOD1STDAY, returning 1 if the first day of the month is a Monday and a null string if not. The remaining formulas in the first row of the calendar simply continue the pattern of H41 and I41.

Once the first row of the calendar is settled, the next three rows are simple. Each cell simply adds one to its predecessor. Things get tricky again at the end of the month, however.

The rightmost cell in the fourth row is the first calendar position that can possi-

bly be the ending day of the month. (It would be the last day of February in a non-leap-year in which February 1 fell on a Sunday.) Therefore, the first calendar position that might have to be blank is the leftmost cell in the fifth row. Here, Mr. McCormack has the formula:

```
@IF (N45=>@DAY (LASTDAY), " ",  
@IF (N45<1, " ", N45+1))
```

Translated to English, this formula reads: "If N45 (the rightmost cell in the fourth row, as Mr. McCormack's calendar is positioned) is equal to or greater than the last day of the month, leave this cell blank. Also leave the cell blank if N45 itself is blank. If neither of these conditions is true, let this cell be equal to N45 plus one." N45, of course, cannot be blank, since we know that cell is not beyond the end of the month. But including this second @IF test allows Mr. McCormack to replicate this formula across the fifth row of his calendar, and that replication takes care of all the month-ending details.

When re-creating this application, be sure to assign the following range names:

\C:	B1
CALDISPLAY:	G36..054
DAY1ST:	B26
DDATE:	B25
GOYEAR:	B21
GOYEARC:	B22
HILITE:	H38..N46
KEY:	B23
LASTDAY:	B28
LOOP:	B7
LOOP1:	B6
MNWORDS:	B29
MOD1STDAY:	B27
PRINTCAL:	H37..N47

Also, be sure to enter the calendar and the macro instructions in the locations listed in Figures 1 and 2. After you've set everything up and named all the ranges, you can use the /Move command to rearrange the application any way you wish.

HINTS, TIPS, QUESTIONS

Share your latest spreadsheet discovery through *PC Magazine's* Spreadsheets. We'll pay you \$50 for any tip we print. Please submit your letter on a disk, together with a printout. Mail your contribution to Spreadsheets, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload it to PC MagNet (see page 8 for access instructions).

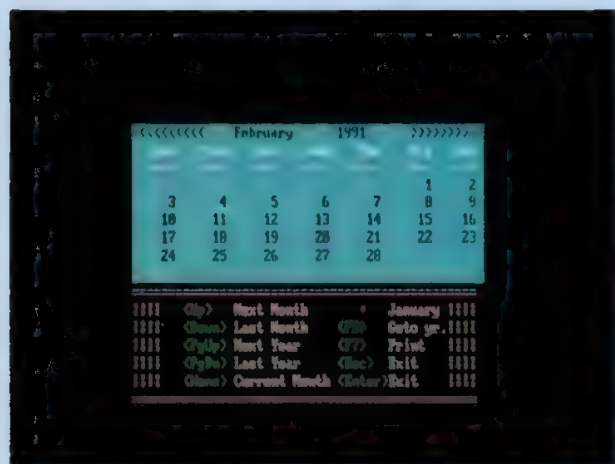


Figure 3: The monthly calendar, generated by the code in Figures 1 and 2, pops up right over your worksheet. The simple menu lets you move to a particular date with ease.

by
Costa Rodis

The Working Word

CHECK TIME IN WORDPERFECT

The *WordPerfect* 5.1 macro shown in Figure 1 displays a graphic box containing the current time. The box remains on-screen for 2 seconds. I assigned my macro to F12 on the keyboard setup, but most people may prefer hotkeying it with Alt-T.

For those who are curious, I've found a slight glitch in an early release of *WordPerfect* 5.1. One of the two Block end codes would remain hidden when this TIME.WPM macro was run from the very beginning of a document. This prevented a blank document screen from really being blank, resulting in a "Retrieve into current document?" message when retrieving from List files. The last {Left}{Right} cursor movement rids the document of any lingering Block end code and assures smooth macro operation, no matter which release of 5.1 you may be using.

Mona Oliver
Hallsville, Missouri



This macro is so handy I find myself using it frequently, especially since my desk clock has long been obscured by piles of paper, disks, and program manuals. Because I like using F12 for Block, I've assigned Ms. Oliver's macro to Ctrl-T.

- **CHECK TIME IN WORDPERFECT:** A macro that flashes the time on your screen may not be the most important one, but it comes in handy when your watch is broken.
- **CHANGE DIRECTORIES IN WORDPERFECT:** Switching directories and displaying the new file listing is a snap with a macro-created menu.

Let's first learn how to assign any macro to a key or key combination, then we'll take a gander at what the TIME.WPM macro does.

To create a macro hotkey you must edit the keyboard definition you currently use. Before doing so, know the full name of the macro—in this case TIME.WPM. Go into Setup (Shift-F1) and choose Keyboard Layout (5). A list of keyboards should appear. If the screen is blank, tap F1 and edit Location of Files (6) to indi-

cate in what directory the keyboard files reside. They have a .WPK extension and should be with your macros, usually C:\WP51.

Move the cursor to the macro keyboard name and select Edit (7). A list of macro keys will appear. Choose Create (4) to add a new key combination to the list. At the Key: prompt tap a key combination you currently don't use, such as Ctrl-T. You are now prompted for a description of the macro. After entering a brief explanation of what the macro does, you'll find yourself in the macro Action screen. Here you can either enter all the commands of the macro or you can nest the original macro; nesting runs a macro from the current macro. To nest TIME.WPM, press Ctrl-PgUp, move the cursor to NEST, and tap the Enter key. Then type the macro name and follow it immediately with a tilde (~). Exit from Setup. Now, every time that you press Ctrl-T the current time will pop up on the top left corner of your screen. Alternatively, after choosing the keyboard, tap R for Retrieve and then press Ctrl-T. At the prompt "Macro:" enter TIME.WPM. You should find that this a faster method than the first.

Here are a few tips for those of you baffled by a few seemingly unusual commands in this macro. The {Macro Commands} code is created within the macro editor by using Ctrl-F10 and then Ctrl-PgUp. Ctrl-F10 toggles you in and out of the regular edit mode to a Macro Commands mode. This allows you to enter commands such as End, Home, PgUp, and so on without first using Ctrl-V.

When {PROMPT} is followed by {Home}, a message is positioned at the top left corner of the screen. The {^Q} (Ctrl-Q) character turns off all current display attributes, while {^N} (Ctrl-N) turns on bold. When preceded by {PROMPT}, the {^P} code lets you precisely place the message text on the screen. In this case, the first {^P} indicates that the following code will mark a specific position for the

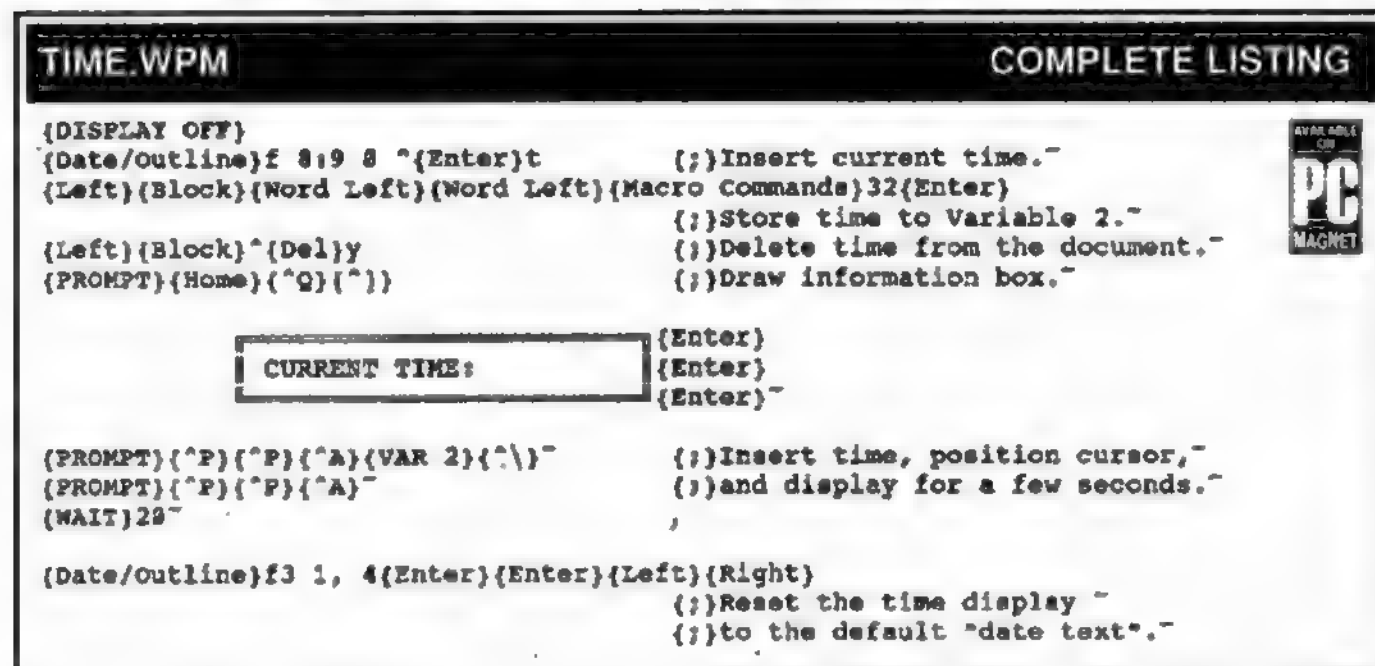


Figure 1: Execute this macro, and *WordPerfect* flashes a small graphic box with the current time. The time stays on-screen for 2 seconds.

The Working Word

cursor; the {^P} that follows places the cursor 16 spaces to the right of the margin. (^P is ASCII character 16.) The code {^A} moves the cursor down one line. The message box was created with ASCII characters, such as 205 for =, 186 for ||, 187 for ¶, 188 for ⌂, 201 for ⑆, and 200 for ⑆. To generate these characters, use the Alt key with your numeric keypad or use *WordPerfect's* Compose feature. For more information, refer to the look-up table in the appendix of the manual.

CHANGE DIRECTORIES IN WORDPERFECT

I've always found it tedious to move from one directory to another, and the *WordPerfect* 5.0 macro, shown in Figure 2, does this task for me. NAVIGATE.WPM displays a menu in the upper-left corner of the screen and presents a choice of directories as well as a Selection prompt at the bottom of the screen. Simply hit the appropriate character key and *WordPerfect* will give a file listing of that directory. The routine tests for uppercase and lowercase, returns a message if an incorrect key is pressed, and restarts the macro. The menu choices are limited to the number of letters in the alphabet. I used letter keys rather than numbers because letters offer you 26 single-character choices, while numbers offer only 9. You can easily edit the macro to change the directory names and add choices.

Horst Kurz
Wooster, Ohio



This macro greatly simplifies the task of changing directories, and anyone with a plethora of subdirectories will find it very handy. Although the macro lists only five possible directories, it's easy to add on as many as you need—keeping in mind that you are limited to the characters A through Z.

The first listing of directory names in the macro is what will actually appear in the menu. Each directory name is preceded by an alphabetic character. You need not type the full path here.

Under {CASE CALL} is a second list, where **choice1** is the label name for Directory 1, **choice2** is the label name for Directory 2, and so on. Each label here is associated with two characters—an uppercase and lowercase letter. This means

NAVIGATE.WPM

COMPLETE LISTING

```
{ON CANCEL}{GO}cancel""
{LABEL}Menu"
{PROMPT}{Del to EOF}
{^}}Directory Navigation Menu(^)
{Enter}{Enter}
  {^}}A(^) - Directory 1{Enter}
  {^}}B(^) - Directory 2{Enter}
  {^}}C(^) - Directory 3{Enter}
  {^}}D(^) - Directory 4{Enter}
  {^}}E(^) - Directory 5{Enter}
{Enter}{Enter}{Enter}{Enter}{Enter}
{Enter}{Enter}{Enter}{Enter}{Enter}
{Enter}{Enter}
{CHAR}1"Selection: (^)0(^){Left}"
{CASE CALL}{VAR 1}"
  a"choice1"A"choice1"
  b"choice2"B"choice2"
  c"choice3"C"choice3"
  d"choice4"D"choice4"
  e"choice5"E"choice5"
{PROMPT}{BELL}Inappropriate Key."
{WAIT}20"
{GO}Menu"
{RETURN}
{LABEL}choice1"
  {DISPLAY OFF}
  {List}Directory{Enter}
  7{Enter}{DISPLAY ON}{Enter}
  {QUIT}
{LABEL}choice2"
  {DISPLAY OFF}
  {List}Directory{Enter}
  7{Enter}{DISPLAY ON}{Enter}
  {QUIT}
{LABEL}choice3"
  {DISPLAY OFF}
  {List}Directory{Enter}
  7{Enter}{DISPLAY ON}{Enter}
  {QUIT}
{LABEL}choice4"
  {DISPLAY OFF}
  {List}Directory{Enter}
  7{Enter}{DISPLAY ON}{Enter}
  {QUIT}
{LABEL}choice5"
  {DISPLAY OFF}
  {List}Directory{Enter}
  7{Enter}{DISPLAY ON}{Enter}
  {QUIT}
{LABEL}cancel"
  {DISPLAY OFF}{DISPLAY ON}

{}}Send cancel key to label at end."
{}}Name label for menu"
{}}Clear screen to build menu."
{}}Menu title"

{}}Name of directory for choice A"
{}}Name of directory for choice B"
{}}Name of directory for choice C"
{}}Name of directory for choice D"
{}}Name of directory for choice E"
{}}Name of directory for choice E"
{}}Put cursor at bottom of screen."

{}}Prompt at Bottom left of screen"
{}}Define variable for character"
{}}and test for case; send action"
{}}to appropriate label."

{}}Message when wrong key is pressed."
{}}Wait 2 seconds,"
{}}then rewrite menu to screen."

{}}Called when A or a is pressed"
{}}Type full path for directory."

{}}Called when B or b is pressed"
{}}Type full path for directory."

{}}Called when C or c is pressed"
{}}Type full path for directory."

{}}Called when D or d is pressed"
{}}Type full path for directory."

{}}Called when E or e is pressed"
{}}Type full path for directory."

{}}Return to edit screen."
```

Figure 2: NAVIGATE.WPM displays a menu with your subdirectories as choices. Simply tap the correct letter and *WordPerfect* changes to that directory and generates a list of its files. You'll have to edit the macro, substituting your own directory names for the choices. You can easily add more options. Note that you can simply write the name of the directory for the menu choice, but you must specify the full pathname under the {LABEL} routines.

that when the letter A is pressed, the label **choice1** is activated.

The labels comprise the third list in the macro. Each label enacts a series of events, in this case listing files for a directory. Note that when you edit the macro or add choices, *the full pathname of a directory must follow the {List} command.*

Let's say the first directory on the menu is A and is named WPFILS. Typing A at the prompt retrieves the label **choice1**. The action of this label is to list files for C:\WPFILS.

The control characters {^} and {^} are begin and end bold codes. They are created within the macro edit screen by

holding down Ctrl and tapping the character to the right of the ^. {^T} turns on underlining, which is turned off with {^U}. Reverse video is initiated with {^R} and turned off with {^S}.

TIPS FROM WORKING WORDSMITHS

Tell fellow users about your latest word processing discovery; we'll pay you \$50 for any tip we print. Send your letter on a disk along with a printout. Mail your contribution to The Working Word, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload it to PC MagNet (see page 8 for access instructions). ■

The ultimate notebook PC and its place in your life.

You've just finished The Big Meeting and you head out of the building, a dozen ideas filling your mind. Budgets, forecasts, letters and directives to members of your team all appear on your mental list of things to do. You hop a cab for the airport, wishing you could get your hands on a PC. Unfortunately, yours is holding down a corner of your desk back at the office.

Wish no more.

Next trip you can tuck away all the computer power you need in the bottom section of your briefcase. Right now, take a few minutes to imagine how it's going to be when you're out there with that list of tasks, several sheets full of notes and your Texas Instruments TravelMate™ 2000 in hand.

The first thing you like about the TM 2000 is its scant 4.4 lbs. — a six pack of soft drinks weighs a lot more. With many of the common notebook computers tipping the scales at around 7 lbs., you might think we left something out. Not much. Your bantam-weight includes a built-in 20MB hard drive, 286™ processor, 10" diagonal VGA screen, AT®-style keyboard, up to two-hour rechargeable battery and standard 1MB RAM. Yes, all that.

At 8.5" x 11", your TM 2000 could almost be lost under a sheet of letterhead. Most three-ring binders are thicker than its 1.4", so you might wonder why it's called a "notebook." You switch on your new TM 2000 to see what you can do with 286 power. You find it already supplied with an array of free extra-value software — standard, not optional: MS-DOS® 4.01, Battery Watch®, LapLink™, Laptop File Manager and a set of special utilities that do things like extend battery charge life and customize the TM 2000 display. What's more, your TM 2000 swallows up huge chunks of software quicker than you can say "twelve megahertz clock speed."

Once on board, you'll like how fast your programs run. They seem to go quicker than your fingers on the keys, and easily as fast as a desk-bound 286. As for take-it-with-you capacity, you have all you need with the 20MB hard disk drive.

Small outside, enormous inside.

You can boot up popular software with room to spare on 1MB RAM, or take on the latest colossus with optional expansion up to 3MB RAM.

Small, yes, but this is no scaled-down compact, robbed of the features you're used to in the office. Take the keyboard, for example. You recognize its AT-enhanced configuration with a full 79-key inventory of the alpha-numerics you know and need. What the skeptics don't



The Texas Instruments TravelMate™ 2000.
4.4 lbs., 286 CPU, 12MHz.

expect, however, is the full size and solid feel of the keys. They're all arranged in less than 11 inches, side to side. Put a ruler to the AT keyboard in your office and you'll wonder how it's possible!

Well, here's part of the secret. You can get an optional outboard numeric keypad. You plug it in when you do heavy number crunching. The rest of the time you don't need it, so it's not there just taking up space. Makes sense.

Easy on the eyes.

As for the display, you're looking at serious high-resolution technology: a 640 x 480 VGA 10" diagonal, sidelit, reversible black-on-white, picture-perfect, triple-supertwist LCD screen that makes complex graphics and windowing applications show up like ink on paper. With 16 gray scales, visibility is magnificent under just about any lighting condition. Check it out!

Major league interface.

The TM 2000 wasn't built to be a minor player, so it can support all the interface capability you need. Its serial (RS-232C) nine-pin interface is standard. There's also a parallel (Centronics) port for your printer. You can drive your VGA color monitor with a CRT interface option. Or you can plug in an optional 2400 bps modem with send/fax capability. An optional multislot expansion station for one full- and one half-size IBM PC/XT/AT® compatible cards rounds out your flexible interface array.

That's not to say you won't have to sacrifice.

To keep you light on your feet, something had to give. So we took the 3.5" floppy disk drive out and made it optional. Now you only carry it with you when you need it. Besides, you can transfer files between your TM 2000 and a desktop PC fast and easy with LapLink.

Awards winner.

When you add it all up, you'll understand why BYTE magazine said, "The TravelMate is as close as you can get to the ultimate portable."* In fact, BYTE gave the TM 2000 its 1990 Award of Excellence, acclaiming its exceptional value for the money and smart design. Not only that, PC World named it their 1990 Best

Buy for its premium power and portability. And PC Magazine was so impressed that its editors gave the TM 2000 their most prestigious awards: the Editor's Choice Award — for two consecutive years — and the 1990 Award for Technical Excellence.

Yes, awards are great. But what we really aim to win is your vote. So we built this new look of power to be one you can count on. After all, Texas Instruments has more than two decades of experience in portable computing under its belt. That's why we're able to support the TM 2000 with a worldwide network of authorized service representatives.

Turn your "things-to-do" into "all done."

Now, about those budgets, forecasts, letters and directives. No problem. You finished them all before your plane touched the ground.

Seeing is believing!

Dial our toll-free number. We'll tell you where you can see the TravelMate 2000 for yourself. And see how light, thin and powerful it really is. Then see yourself finding a place for this ultimate notebook PC in your life. It'll cost less than you think!

Call today! You'll receive a brochure that's a life-size replica of the TM 2000 along with the name of a dealer near you. Don't wait!

A lot more speed and power. Just a little more weight.

The Texas Instruments TravelMate™ 3000. Only 5.7 lbs. including 20 MHz 386™ SX CPU, 20-3040-60MB hard disk, built-in 3.5" floppy drive and internal rechargeable battery that works up to three hours. It's a mere 1.3 lbs. more than the TM 2000, but magnitudes beyond in capacity. Compare them here or at your dealer.



The Texas Instruments TravelMate™ 3000.
8 1/2" x 11" and only 1.8" thin.

Size up these heavy-duty lightweights for yourself:

	TM 2000	TM 3000
Size	4.4 pounds, 11" x 8.5" x 1.4"	5.7 pounds, 11" x 8.5" x 1.8"
Performance	12 MHz 286 processor, 1MB RAM (expandable to 3MB)	20 MHz 386SX processor, 2MB RAM (expandable to 6MB)
Display	Reversible 10" black-on-white sidelit LCD with 640 x 480 VGA resolution in 16 shades of gray	Reversible 10" black-on-white sidelit LCD with 640 x 480 VGA resolution in 32 shades of gray
Storage	20MB hard drive, optional external 1.44MB 3.5" floppy drive module	20-3040-60MB hard drive, internal 1.44MB 3.5" floppy drive

Call now...

1-800-527-3500


**TEXAS
INSTRUMENTS**

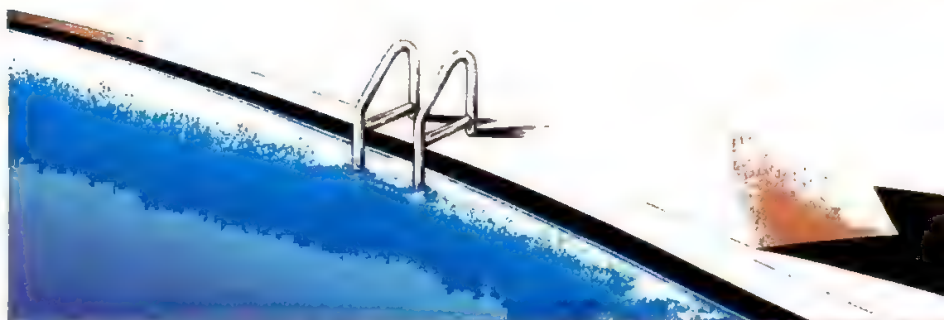
Maynard

An ARCHIVE Company

SEE US AT
COMDEX
BOOTH
#332



Score perfect marks with the simplest, most versatile backup system for 286, 386, 486 PCs or PS/2 computers, and multiuser systems, including all the popular versions of UNIX...



ArchiveVP®—data backup on a variety of platforms.

ArchiveVP systems offer full-featured tape backup for both individual workstations and a wide variety of networks. In addition to DOS, they support SCO XENIX and UNIX, Interactive UNIX, Intel UNIX and AIX. THEOS and QNX support are also available.

The ArchiveVP family of backup systems provides internal and portable storage from 60 to 250 megabytes

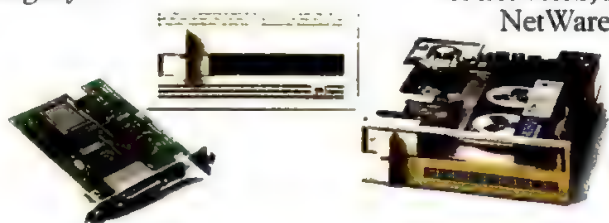
and they store and retrieve at an impressive 6.75MB per minute.

ArchiveVP systems include powerful new QICstream® 2.01 software for DOS with easy to use menus and features like advanced file selection and filtering including date/time, include/exclude and wildcard options. We've also added more error recovery and tape-handling options for both attended and unattended backup. Our backup software is compatible with a host of networks, including Novell NetWare 2.15 with mixed

IBM/Macintosh system support, 3 COM, Token Ring, and more. If you're a power user of DOS, PC-based UNIX, or operate a small to medium LAN, dive into Maynard's ArchiveVP. Experience reliability, innovation and service from the world leaders in data backup. Because at Maynard—we're backing you in every way. Contact your local dealer—or call.

1-800-821-8782

Maynard Electronics, Inc.
Marketing Communications
36 Skyline Drive
Lake Mary, Florida 32746
1-407-263-3500 (USA)
011-44-494-473-434 (UK)
CIRCLE 495 ON READER SERVICE CARD



by
Neil J. Rubenking

User-to-User

REPEATING COMMANDS

There are times when you need to use the same DOS command line over and over, and it would be nice to have a quick way to do so. CMD.BAT, shown in Figure 1, does exactly that. It automatically creates a file—CMDX.BAT—that will store and rerun your DOS command line. Suppose you're making several changes to a file ABC.TXT. You're working on a RAM disk, so you periodically copy the file to permanent storage. Instead of repeatedly entering the line

```
COPY ABC.TXT C:\SOMEDIR /V
```

you can use CMD.BAT to reduce your keystrokes. The first time, you'd enter

```
CMD COPY ABC.TXT C:\SOMEDIR /V
```

After that, any time you wanted to copy the file you'd just enter CMD.

If you call CMD.BAT with no command line arguments, it assumes you want to execute an already-created CMDX.BAT. Calling CMD with ? as the only argument simply displays the current CMDX.BAT. If there are arguments other than ?, CMD assumes you want to store these arguments as a repeatable command. It creates CMDX.BAT with your command line embedded and then executes it.

■ **REPEATING COMMANDS:** This batch file saves time when you need to execute the same command again and again.

■ **IDENTIFYING FILE TYPES:** Use this clever batch routine to distinguish among types of files.

CMD.BAT works with any DOS command line of nine words or less. You can extend the nine-word limit by appending slash-delimited program switches to the previous argument, for example

```
COPY ABC.TXT C:\SOMEDIR/V
```

You get a bonus when you use CMD—you can use environment variables in your DOS command line. First, create an environment variable, for instance

```
SET DIR1=C:\SOMEDIR
```

Now your command line can read

```
CMD COPY ABC.TXT %DIR1% /V
```

This adds flexibility—you can change the directory whenever you want, without changing the command line.

Robert Chiesa
Canton, Massachusetts



If you just need to repeat the same command over and over, it's quicker to retrieve the command with the F3 key. But F3 brings back only the very last command. CMD.BAT retrieves your chosen command whenever you want, as many times as you want. And the ability to use environment variables on the command line is indeed a bonus. Try the command

```
ECHO %PATH%
```

at the DOS prompt—all you get is %PATH%. Now try

```
CMD ECHO %PATH%
```

and you'll get your current path.

CMD.BAT has one limitation the author didn't mention—it won't store commands that use the redirection symbols (>, <, and |). DOS strips the redirection information from the command line before passing it to the program. So, for example, if you entered

```
CMD DIR | SORT | MORE
```

CMDX would store only DIR. Don't use CMD.BAT with commands involving redirection.

IDENTIFYING FILE TYPES

To tighten security on our public-access bulletin board, I was asked to find a program that would identify the type of file being uploaded: .COM, .EXE, compressed, or none of the above. We needed this capability because only ASCII (that is, word processed) documents are valid uploads—games and programs are not.

I wasn't able to find any utility that could

CMD.BAT **COMPLETE LISTING**

```

@ECHO off
REM Create D:\BAT\CMDX.BAT, a batch file to repeat
REM the command contained in arguments #1 to #9.
IF [%1]==[] D:\BAT\CMDX
IF %1==?. GOTO type
SHIFT
IF NOT [%9]==[] GOTO toomany
ECHO @ECHO OFF >D:\BAT\CMDX.BAT
ECHO %2 %3 %4 %5 %6 %7 %8 >>D:\BAT\CMDX.BAT
D:\BAT\CMDX.BAT
:toomany
ECHO CMD.BAT: only 9 arguments allowed.
:type
ECHO CMDX.BAT contains these two lines:
ECHO *-----*
TYPE D:\BAT\CMDX.BAT
```

Figure 1: CMD.BAT stores and executes a DOS command line—CMD with no arguments repeats the stored command.

FILETYPE.BAT

COMPLETE LISTING

```
@ECHO OFF
REM FILETYPE.BAT

:NO FILESPEC
IF %1==. GOTO END

:ZIP
SET FT=ZIP
FIND /N "PK" %1 | FIND "[1]" > FILETYP1.$$$
COPY FILETYP1.$$$ FILETYPE.$$$ >NUL
IF EXIST FILETYPE.$$$ GOTO END

:EXEC
SET FT=EXE
FIND /N "MZ" %1 | FIND "[1]" > FILETYP2.$$$
COPY FILETYP2.$$$ FILETYPE.$$$ >NUL
IF EXIST FILETYPE.$$$ GOTO END

:COM
SET FT=COM
FIND /N "θ" %1 | FIND "[1]" > FILETYP3.$$$
COPY FILETYP3.$$$ FILETYPE.$$$ >NUL
IF EXIST FILETYPE.$$$ GOTO END

:WordPerfect
SET FT=WordPerfect
REM This v blank character below is an ASCII 255
FIND /N "WPC" %1 | FIND "[1]" > FILETYP4.$$$
REM This blank character above is an ASCII 255
COPY FILETYP4.$$$ FILETYPE.$$$ >NUL
IF EXIST FILETYPE.$$$ GOTO END

:Device Driver
SET FT=DeviceDriver
REM The vvvv four seeming blanks below are all ASCII 255
FIND /N "    " %1 | FIND "[1]" > FILETYP5.$$$
REM The four seeming blanks above are all ASCII 255
COPY FILETYP5.$$$ FILETYPE.$$$ >NUL
IF EXIST FILETYPE.$$$ GOTO END

SET FT=
ECHO FILE TYPE IS NOT EXE, COM, ZIP, WordPerfect, OR Device Driver.
GOTO OUT

:END
ECHO FILE TYPE IS: %FT%
SET FT=

:OUT
FOR %%A IN (1 2 3 4 5 E) DO IF EXIST FILETYP%%A.$$$ DEL FILETYP%%A.$$$ >NUL
:END
```

Figure 2: This batch file scans the first line of any file for certain signatures.

FTDIR.BAT

COMPLETE LISTING

```
@ECHO OFF
REM FTDIR.BAT
FOR %%A IN (*.*) DO CALL FILETYPE %%A
```

Figure 3: This batch file runs FILETYPE.BAT on every file in a directory.

distinguish the file type, at least in a way that I could use for processing in a batch file. Happily, I was able to solve the problem. The batch file in Figure 2 shows how.

The routine employed here uses the FIND filter to look for the "signatures" of .EXE, .COM, and .ZIP (compressed) files. I noticed that all .EXEs have a header of MZ;

all .COMs begin with an ASCII 233 (θ); and all of Phil Katz's .ZIPs begin with PK.

To help ensure that these signatures are the real thing, the first FIND command uses the /N switch to number the lines that meet its search criteria. Then, the second FIND searches for a [1], filtering out all lines except the one that may occur on line 1, the one that we're looking for.

The technique works well but it isn't bulletproof. If you placed a PK, an MZ, or the Greek character θ on the first line of a text file, it would fool the batch file.

Note that if you want to run this test on all files in a directory, you must use a second batch file with a FOR loop to call FILETYPE. In FTDIR.BAT (Figure 3), each file in

turn gets passed to FILETYPE as %1 and is then processed.

Daniel E. Goldberg
New York, New York



This clever double use of the FIND filter checks not only whether a particular string occurs in a file, but whether it is on the first line. That's two calls to FIND for each file type you're checking. If you're going to use the FILETYPE batch file to check a number of files, you'd do well to copy the FIND program to a RAM disk.

Each batch line using FIND writes its output to a temporary file. If the signature in question is found on the first line of the file, the temporary file will contain that line; otherwise it will be empty. DOS's COPY command won't copy a zero-byte file, so the next two lines serve as a test for whether the signature was found. If the file didn't contain the signature, then the temporary file was empty, and COPY didn't copy it to a second temporary file.

The .EXE and .ZIP signatures are dependable; every such file will begin with the expected signature. PKZIP always generates the initial PK, and every .EXE file must begin with MZ (the initials of Mark Zbikowski, who worked on the early development of DOS). A .COM file, on the other hand, is simply a disk image of a program in memory. It can begin with any byte that corresponds to a legitimate machine instruction. It happens that many .COM programs start with an instruction to jump farther into the program, and the theta (θ) character corresponds to that jump instruction. So this batch file won't catch some .COM programs—out of 50 I chose at random, 10 didn't register as .COM with FILETYPE.

Note that you can find certain other file types this way. WordPerfect 5.1 files and macros all start with an ASCII 255 character followed by WPC, for example. Most (but not all) device drivers begin with four ASCII 255 characters. I added these file types to the demo batch file.

SHARE YOUR SECRETS

Reveal your latest DOS and systems discoveries through User-to-User; we'll pay you \$50 for any submission we print. Please submit your letter on a disk together with a printout. Mail your contribution to User-to-User, PC Magazine, One Park Avenue, New York, NY 10016, or upload it to PC MagNet (see page 8 for access instructions).

The industry's best-seller*
just got better.



The Panasonic® 1124*i* is here.



The Panasonic KX-P1124 has probably won more awards than any other dot matrix 24-pin printer in history. The KX-P1124*i* represents a significant improvement.

It's simpler to operate. With a new LCD display on our EZ-Set™ operator panel, so you can not only see what you're doing...but how.

It's faster. In fact, at up to 300 cps in draft, it's faster than most of the other popular printers in its class.

It now has 11 built-in fonts, including a Super Letter Quality font, to give all your most important business correspondence a truly professional look.

It's easier to load. With front, bottom and rear paper paths made even more convenient by a new and simpler tractor feed. Yet with all this enhanced power and flexibility, the 1124*i* is still one of the most attractively-priced printers around.

That, too, is the Panasonic way. And the reason why our strongest impression is value. For further information on the KX-P1124*i*, and the name of the dealer nearest you, call **1-800-742-8086**.

* Based on US dollar market share of competitive models for the 12 months ending December, 1990, as reported by InfoCorp (1/91)

*Printers, Computers, Peripherals,
Copiers, Typewriters and Facsimiles*

Panasonic
Office Automation 

*Engineered for the office.
Designed for people.*

New Turbo Pascal for Windows Don't Leave DOS Without It!

Go with Borland, the leader in OOP and Windows programming, when you're heading for the Windows frontier. With Turbo Pascal® for Windows, your Windows applications will be faster and easier to create.

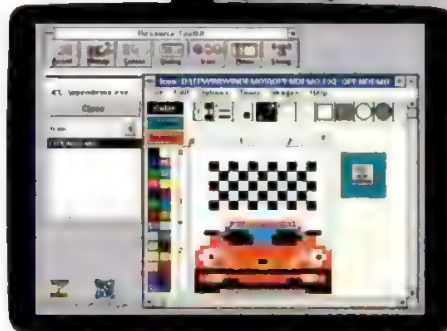
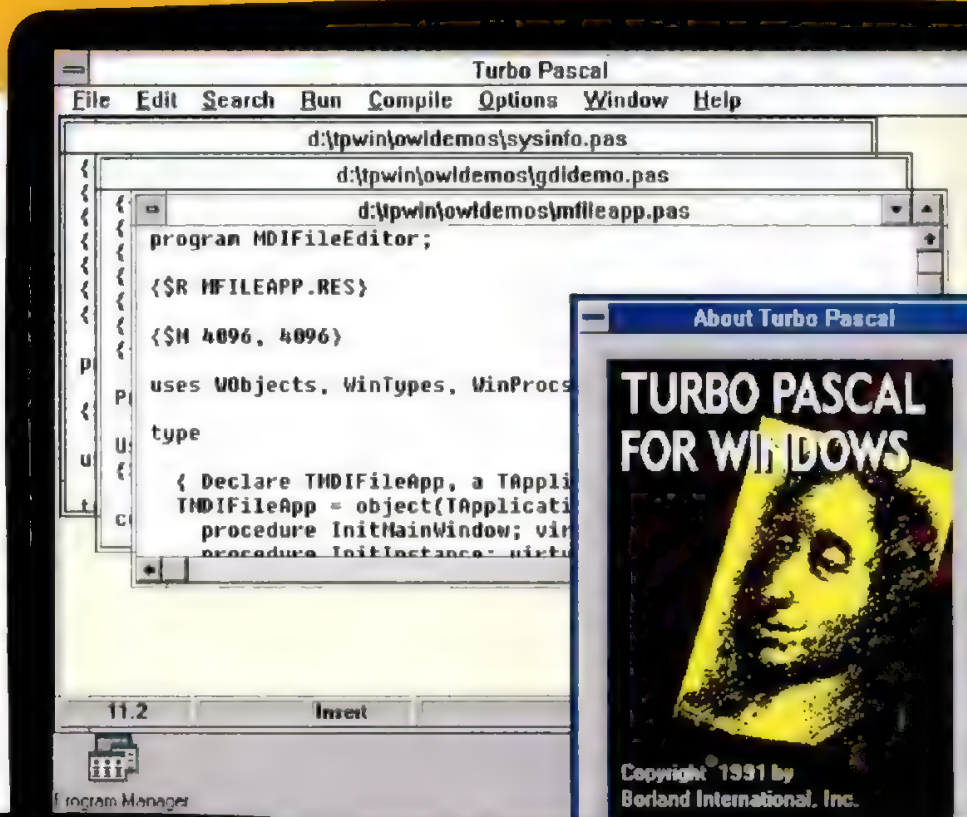
Turbo Pascal for Windows includes Borland's new ObjectWindows™ application framework FREE. So now you can develop Windows applications fast because they automatically inherit code for windows, menus, dialogs, controls, and more.

Create Windows Applications for Less

Turbo Pascal for Windows gives you more *and* costs you less than other Windows development systems. It's designed exclusively for Windows programming, and everything you

need is included in the one low price. You don't need to buy the Microsoft® Windows Software Development Kit (SDK).

Turbo Pascal for Windows is the easiest way to make your next program a Windows program.



▲ **Create Windows Applications in Windows.** The Windows Integrated Development Environment (IDE) lets you create, edit, compile and run your programs, all from within Windows.

◀ **Create Windows Resources Visually.** Using the Resource Toolkit, you can visually create your Windows user interfaces without programming.

**See Your Dealer Today or Call
1-800-331-0877 Now.**

**Current owners of Turbo Pascal,
call Borland
for a special offer!***



B O R L A N D

The Leader in Object-Oriented Programming for Windows and DOS

CODE: MF14

*Offer good in U.S. and Canada only. Copyright © 1991 Borland. BI 1396

CIRCLE 295 ON READER SERVICE CARD

edited by
Trudy Neuhaus

Languages

COMPARING TWO DIRECTORIES

I often need to compare the contents of different directories or compare a backup floppy with a hard disk directory. Since DISKCOMP can't do this, I wrote a program, 2DIR, that can.

Written with Microsoft C, 2DIR.C (listed in Figure 1) lets you visually compare the contents of two different directories at the same time. The directories can be on different disks, even if one is a floppy disk and the other is not.

The syntax for 2DIR is

```
2DIR <dirname1> <dirname2>
```

where *dirname1* and *dirname2* are the directories you want to compare.

You can compile 2DIR with Microsoft C, Versions 5.1 and 6.x, and with QuickC, Version 2.x.

John R. Hidalgo
The Woodlands, Texas

■ **COMPARING TWO DIRECTORIES:** 2DIR is a handy program and a good example of how to find and display file information in C.

■ **NETWORK SUPPORT:** Upgrade to the new version of Power Basic to gain network support.



There's no doubt that 2DIR is a great utility to have around. In his enthusiasm, Mr. Hidalgo added a bit more code than was really needed. What is listed here is a streamlined version of his program. By removing most of the global variables and some goto statements and by altering the file information

storage mechanism, I was able to reduce the code by about 60 lines.

2DIR is actually quite simple. It calls the `process_dir` function to save your current drive/directory, switch to and read the first drive/directory you've selected, restore what was the current directory on that drive, and finally return you to the drive/directory that you started from. It repeats the same process for the second drive/directory you specify. That last step makes it possible for 2DIR users to specify . and .. from the command line, since these will always be relative to the starting directory.

2DIR stores the file information in a set of arrays: one for the filename and extension, and others for the time stamp, date stamp, and file size. While these are set (via the `MAXFILES` macro) to hold file information for a total of 1,024 files (and occupy about 21K), you can increase this quite a bit, since 2DIR doesn't make any inordinate Stack or Heap demands. Just

2DIR.C

1 of 2

```
// 2DIR.C: Display 2 Directories.

#include<stdio.h>
#include<dos.h>
#include<stdlib.h>
#include<string.h>
#include<direct.h>
#include<graph.h>

#define DriveLet(str)  (*str - 'A' + 1)
#define DIRNAMELEN  67
#define MAXFILES    1024

char *orgdir = NULL;
char full_names[MAXFILES][13];
long sizes[MAXFILES], lenfiles1 = 0L, lenfiles2 = 0L;
unsigned dates[MAXFILES], times[MAXFILES];
int numfiles1, numfiles2;

void terminate(void);
void display_direntry(int x1);
void read_files_info(int mx);
void setdir(char *dirname);
void process_dir(char *dirname);

void main(int argc, char *argv[])
{
    int x1, x2;
    char dirname1[DIRNAMELEN], dirname2[DIRNAMELEN];

    if(argc != 3)
    {
        puts("Usage: 2dir <dirname> <dirname>");
        exit(0);
    }

    strcpy(argv[1]);
    strcpy(argv[2]);
    orgdir = getcwd(NULL, DIRNAMELEN); // save original directory

    // switch to first dir
    process_dir(argv[1]);
```

```
// switch to 2nd dir and do the same..
process_dir(argv[2]);

// display the directories...
clearscreen( GCLEARSCREEN );
sprintf(dirname1, "Directory 1a", argv[1]);
sprintf(dirname2, "Directory 1a", argv[2]);
printf("a-400-400", dirname1, dirname2);

x1 = 0;
x2 = numfiles1;
if(x2 > numfiles2)
    numfiles2 = x2;

while(x1 < numfiles1 || x2 < numfiles2)
{
    if(x1 < numfiles1)
    {
        display_direntry(x1);
        lenfiles1 += sizes[x1];
        x1++;
    }
    else
        printf("\n330", "");
    if(x2 < numfiles2)
    {
        display_direntry(x2);
        lenfiles2 += sizes[x2];
        x2++;
    }

    if(numfiles1 > (numfiles2 - numfiles1))
        printf("\n");
    if(x1 == numfiles1)
        printf("%5u file(s) occupying %ld bytes", numfiles1, lenfiles1);
    printf("\n");
    if(x2 == numfiles2)
        printf("%5u file(s) occupying %ld bytes",
            numfiles2 - numfiles1, lenfiles2);
    terminate();
}
```



Figure 1: 2DIR displays two directories from any drive for easy on-screen comparison.

```

void process_dir(char *dirname)
{
    unsigned drive, numdrives;
    char *original;

    if(dirname[1] == ':')
    {
        drive = DriveLet(dirname);
        _dos_setdrive(drive, &numdrives);
        original = getcwd(NULL, DIRNAMELEN-1);
    }

    if(chdir(dirname))
    {
        printf("\n    Directory %s Does Not Exist\n", dirname);
        setdir(original);
        free(original);
        terminate();
    }

    read_files_info(numfiles);

    setdir(original);
    setdir(origdir);
}

// displays each entry
void display_direntry(int i)
{
    char *exten, *m;
    unsigned xdate, xtime, hour;

    if(exten = strchr(full_names[i], '.'))
    {
        *exten = '\0';
        exten++;
    }
    else
        exten = " ";

    xdate = dates[i];
    xtime = times[i];
    if((hour = (xtime >> 11)) > 12)
    {
        hour -= 12;
        m = 'p';
    }
    else
        m = 'a';
    if(hour == 0)
        hour = 12;

    printf("%04d-%02d-%02d %02d-%02d-%02d %02d%02d%02c",
        (i < numfiles1) ? "n" : " ",
        full_names[i], exten, sizes[i],
        (xdate >> 5) & 0x00ff, (xdate & 0x00ff), (xdate >> 9) & 00,
        hour, (xtime >> 5) & 0x3f, m);
}

// resets all directories and terminates
void terminate(void)
{
    setdir(origdir);
    printf("\n");
    exit(0);
}

// sets drive and directory
void setdir(char *dirname)
{
    unsigned numdrives, drive;

    if(dirname && dirname[1] == ':')
    {
        drive = DriveLet(dirname);
        _dos_setdrive(drive, &numdrives);
        chdir(dirname);
    }
}

// reads each directory
void read_files_info(int mx)
{
    int i = mx, status;
    struct find_t fileinfo;

    status = _dos_findfirst(".",
        (_A_NORMAL | _A_RDONLY | _A_ARCH), &fileinfo);
    while(!status)
    {
        strcpy(full_names[i], fileinfo.name);
        sizes[i] = fileinfo.size;
        dates[i] = fileinfo.wr_date;
        times[i] = fileinfo.wr_time;

        i++;
        if(i >= MAXFILES)
        {
            puts("Too many directory entries for 2dir!\n");
            terminate();
        }

        status = _dos_findnext(&fileinfo);
    }
    if(mx == 0)
        numfiles1 = i;
    else
        numfiles2 = i;
}

```

multiply the MAXFILES setting by 21 to determine the collective space requirements of these arrays.

Note that 2DIR makes pretty efficient use of these arrays: if it finds 24 files in one directory and 68 in another, only the first 92 array elements are used. Thus, if an exceptionally large directory (700 entries, for instance) is compared with a smaller one (100 entries) there is plenty of room for both. The numfiles1 and numfiles2 variables are indexes to the last entry in each part of the array.

2DIR calls display_direntry to display the information on each file. This function alone allowed me to cut a considerable amount of deadwood code, mostly that used to format date and time stamps. Instead, this function uses a few simple bitwise shifts coupled with the power of the printf library function. I also added a summary that displays the total number of files found and the total space that they occupy (in bytes).

In short, I think you will find that this is

quite a useful utility as well as a good example of how to find and display file information in the C language.

—Richard Hale Shaw

NETWORK SUPPORT

I've invested a lot of time and money developing a program written in Turbo Basic. Now I find that I need to use the program on a network. However, Turbo Basic does not support record locking and unlocking. When I called Borland, I was told this would be fairly easy to accomplish using CALL INTERRUPT. The problem is that I don't know how to do this. Can you help?

Bill Miller
Webster, New York



Unfortunately, you can't add network support to a Turbo Basic program using CALL INTERRUPT. Even Version 2.0 of that compiler, Power Basic, from Spectra Publishing, did not support record and file locking. Because of the way these compilers open files inter-

nally, using CALL INTERRUPT to access the locking services of DOS interrupt 21h will fail.

But don't give up hope. There is a newer version of Power Basic that includes not only network support but many other important enhancements. You can upgrade your version of Turbo Basic directly through Spectra by sending your serial number along with \$59 (plus \$6 for shipping) to Spectra Publishing, 1030D East Duane, Sunnyvale, CA 94086. You can also order updates by phoning 800-245-6717.—Ethan Winer

SPEAK YOUR LANGUAGE

Share your knowledge of BASIC, C, Pascal, FORTRAN, and COBOL with Languages readers; we'll pay you \$50 for any tip we print. Please send a disk along with a printout. Mail your contribution to Languages, PC Magazine, One Park Avenue, New York, NY 10016, or upload it to PC MagNet (see page 8 for access instructions).

ANNOUNCING

COMPUTER SELECT™

The Most Complete Database Of Computer Product Information Available



Get instant access to more than...

- ✓ 60,000 articles and abstracts from over 140 leading publications
- ✓ 67,000 hardware, software and communications product specs
- ✓ 11,000 company profiles, including addresses and phone numbers
- ✓ 8,000 definitions of computer and telecommunications terms.

Tens of thousands of reviews, analyses, buyer's guides and manufacturer listings—on one disc! COMPUTER SELECT makes it easy to browse titles, read entire articles, check abstracts and find the names and addresses of manufacturers...fast. You can copy data to a file or print out all or part of your search results. Call for a free demonstration disk!

Now there's COMPUTER SELECT. It's the new, enhanced version of the Computer Library database, developed by the publishers of PC Magazine and PC Week. With COMPUTER SELECT you can identify, evaluate and select the computer products you need in a fraction of the time.

Find All The Hardware And Software Information You Need...From Product Evaluations And Specifications Right Down To The Manufacturer's Phone Number

COMPUTER SELECT gives you immediate access to information from the best magazines, newsletters, technical and business publications reporting on the

COMPUTER SELECT HELPS ANSWER KEY QUESTIONS FASTER, SMARTER, EASIER

1. In a given product category, such as battery-powered 20 mhz 80386-sx portable computers, what are the available products...their specifications...their prices?
2. What are all the products in a given category whose list price is less than my budget?
3. Which products earned the best reviews in a given category?
4. What does the installed user base say about my options?
5. Will it run on my LAN?
6. What tips and techniques can I learn to get more from the products I use?
7. If I buy a particular product now, is the manufacturer likely to be in business if I need help later?
8. What are the benefits of upgrading to the new version of a software product I use?
9. How do I reach a manufacturer? Is there an 800 number?
10. What are the marketing strategies of a given computer industry company...who is the key marketing contact?

CIRCLE 158 ON READER SERVICE CARD

computer industry. Researching products can be done quickly and efficiently right at your desk.

Then, when you find the product that's best for your needs, you can obtain its specifications and locate the manufacturer in a snap. Because now COMPUTER SELECT incorporates all the reference information from *Data Sources*, the leading computer industry directory. That means you'll find specs for over 67,000 hardware, software and data communications products—plus profiles of the 11,000 companies that make the products you want.

YOU'LL SEE RESULTS IN LESS THAN ONE HOUR

New users are doing productive work in less than one hour. No installation is needed. Just pop in the CD-ROM disc and a few simple steps locate, retrieve and print the information you want. And a new, updated disc is sent to you each month so you'll always have current product information.



COMPUTER SELECT helps you S-T-R-E-T-C-H your resources!

In today's economic climate many companies have put a lid on support expenditures, but not on workload or expectations. That's why COMPUTER SELECT is more essential than ever. It's designed to stretch your support resources and promote cost-effective purchasing.

"COMPUTER SELECT is the best single source of industry information available, and it's at my fingertips whenever I need it."

Jonathan D. Lazarus / Microsoft Corporation
Director, Systems Strategy

"The real value of COMPUTER SELECT is in the hidden cost of missed information that could be mission-critical. With this product's ability to conduct broad-based queries, you can be confident that you have checked all the relevant sources and you're thoroughly up-to-date."

Bob Hayes / Nordstrom, Inc.
Technology Architecture Manager

"I was looking for a tape backup device that could hold 2.2 gigabytes. A search like that used to take days. With COMPUTER SELECT it took 10 minutes to get all the information I needed."

Joseph Curtis / Con Edison
General Manager for Systems Engineering

FREE!

If you call now and become a COMPUTER SELECT subscriber you'll receive a BONUS DISC FREE!

This disc contains the complete COMPUTER SELECT publication file covering all of 1990 to use as the base of your computer library. Combined with the new discs you'll receive as a subscriber, you'll have a comprehensive database of both historical and current information!

COMPUTER SELECT is "Highly Recommended" for...

• Micro Managers • PC Coordinators • MIS Directors • LAN Administrators • Purchasing Agents • Information Center Managers • User-Support Groups • Training Organizations • Programmers • Developers • Product Marketers and Planners • Resellers • OEMS, VARs, System Integrators • Journalists, Consultants, Industry Analysts • Salespeople, Public Relations Managers • Law Firms

CALL NOW FOR A FREE DEMONSTRATION DISK

212-503-4400

COMPUTER

LIBRARY™

Computer Library, Computer Select and Data Sources® are trademarks of Ziff Communications Company © 1991 Ziff Communications Company

American Classic.



Jetzt auf Deutsch.



Introducing not a mere translation, but a new magazine in the image of *PC Magazine*, for German buyers, in German, with its own PC Labs/Germany and the kind of Ziff-Davis editorial excellence that has made *PC Magazine* an American classic.

Published monthly in Munich, with an average issue distribution of 170,000 copies, *PC Professionell* is the magazine that finally reaches brand specifiers in German business.

With our introductory advertising rates and free translation services, you won't be able to resist *PC Professionell*.

Because at last you can get into the biggest overseas market in a dependable advertising medium at virtually no risk.

Call *PC Professionell's* Ad Director in the U.S., Chris Tice at 617/393-3530.

by
Jeff Prosise

Tutor

CONFIGURING YOUR SYSTEM

When I install a new card on my IBM Model 60, the PS/2 configuration menu allows me to specify I/O addresses, IRQ levels, and arbitration levels. I generally get things to work by trial and error, but I've been wondering: Is there a logical way to choose parameters? And can you explain what these terms mean?

Daniel J. Leduc
Starkville, Mississippi



First, the terms. *I/O address* refers to the port address (or range of port addresses) that a card or device will use. CPUs typically interface with devices plugged into the bus by reading and writing values to I/O (input/output) ports with machine code IN and OUT instructions. I/O ports are identified by number, usually in hexadecimal form. For example, the code sequence

```
mov    dx, 3FDh
repeat: in    al, dx
        test  al, 20h
        jz    repeat
        mov   al, 41h
        mov   dx, 3F8h
        out   dx, al
```

outputs a byte of data (the value 41h loaded into AL in the fifth line) to serial port COM1. It first checks the status of the COM port by reading a byte from port 3FDh (the port address of COM1's Line Status register), then enters a loop, alternately rereading the status and checking bit 5 of the return value with the instruction TEST AL, 20h. When the bit comes back set, indicating the serial port is ready to transmit data, the routine outputs the data by OUTing it to port address 3F8h, where the serial port's Transmit Holding register is located. This procedure is very common in communications programs. And it can work only if the program knows what I/O addresses (in this case, 3FDh and 3F8h) to use to communicate with the serial port.

■ **CONFIGURING YOUR SYSTEM:** If you're baffled by the parameters you need to specify when setting up your system, this guide will help.

■ **FASTOPEN AND SMARTDRIVE:** Add these to your start-up files and watch how fast your hard disk operates!

In fact, the serial port doesn't just use addresses 3F8h and 3FDh. COM1 reserves the whole range of addresses from 3F8h to 3FFh and uses them to make 12 internal registers (11 in older serial ports) accessible to the CPU. By convention, COM2 reserves the range 2F8h through 2FFh. And COM3 and COM4 most often use 3E8h through 3EFh and 2E8h through 2EFh, though the absence of standards governing their actual locations means that these addresses can vary.

IRQ levels, also called *interrupt levels* (IRQ stands for Interrupt ReQuest), dictate what IRQ line the associated device will use to grab the CPU's attention when events require it to. Hardware interrupts and IRQ levels were discussed in the December 26, 1989, Tutor column.

In essence, an IRQ line is a physical connection between a device and a system board chip called an *interrupt controller* that enables the device to raise a flag telling the CPU it needs service. PCs and XT's have eight different IRQ levels, numbered 0 through 7; AT's and PS/2's have 16, in two sets of 8.

The job of the interrupt controller is to prioritize incoming interrupts and pass them on to the CPU (which has only one IRQ line) one at a time. The serial port offers another good example of how interrupts work and how IRQ levels affect

the operation of boards on the bus. By default, serial port COM1 is assigned IRQ level 4, abbreviated IRQ4. Communications programs typically program COM1 to interrupt the CPU any time an incoming character is received. When the CPU handles the interrupt, the communications program executes an interrupt handler that reads and buffers the incoming byte. The communications program must know what IRQ level the serial port is operating at, or it can't aid in servicing the interrupt. The lower the IRQ level, the higher the priority the associated device receives. For example, in all IBM PC implementations, the keyboard uses IRQ1. If the serial port, using IRQ4, attempts to interrupt the CPU while a keystroke is being processed on IRQ1, the interrupt controller forces the serial port to wait its turn. If an IRQ7 interrupt is being serviced, however (IRQ7 is normally used by parallel port LPT1), the interrupt controller will allow IRQ4 to take precedence and temporarily interrupt what the CPU is doing in order to service the serial port.

IRQ levels 8 through 15, which appear on systems with dual interrupt controllers (AT, PS/2, 286, 386, and 486 systems), are the exceptions. Because of the way the two interrupt controllers are joined, with the interrupt line from the "slave" controller wired into IRQ2 on the "master," IRQ levels 8 through 15 take precedence over levels 3 through 7. Within the range of 8 through 15, however, the lower-is-higher rule applies.

Arbitration levels assign priorities to devices that want to temporarily take control of the bus the same way interrupt levels prioritize access to the CPU. In the world of PCs, arbitration levels are unique to Micro Channel and EISA buses (the AT bus has no central arbitration control mechanism). When a device such as a LAN adapter or fixed disk controller wants to take over the bus to perform a task such as a block data transfer without involving the CPU, it sends a signal to the central arbitration controller. This signal

Tutor

requests permission (in Micro Channel systems, the destination for such requests is called the *Central Arbitration Control Point*; in EISA systems, it's called the *Centralized Arbitration Control* unit). If no device with a higher-priority arbitration level objects (or already has control of the bus), the request is granted.

Like interrupts, arbitration levels are prioritized, and the lower the number, the higher the priority. Conflicts between devices contending for control of the bus should never occur on a PS/2, because the System Configuration utility doesn't allow two devices to be assigned the same priority. The Micro Channel bus contains four arbitration lines, supporting 16 different levels of arbitration. As usual, the lower the level, the higher the priority. Memory refresh and NMI (Non-Maskable Interrupts, used to report parity check errors in memory) are assigned separate, higher priority levels so that they take precedence over everything else.

On PS/2s, I/O addresses, IRQ levels,

and arbitration levels are selected through the Programmable Option Select (POS) feature of the Micro Channel bus. On AT-bus systems, I/O addresses and IRQ levels are selected by setting jumpers or DIP switches on the I/O boards themselves. In general, there are two rules to follow in assigning these parameters:

- Make sure every device has a unique I/O address, IRQ level, and when applicable, arbitration level. One example: When you install a Microsoft bus mouse in your PC, jumpers on the board allow you to select IRQ2, 3, 4, or 5. If you have a serial port configured as COM1, don't choose IRQ4 for the mouse. That's the interrupt level COM1 uses.

- Where standards exist, go by those standards. For example, COM1 and COM2 always use the I/O addresses mentioned earlier and IRQ levels 4 and 3. If you set them to something else, your software probably won't recognize them. For the arbitration level of a LAN adapter, however, there are probably several values that will work, because software isn't involved in arbitration for the bus.

There are always exceptions. For example, COM3 and COM4 normally use

IRQ4 and IRQ3 just like COM1 and COM2 do. This works, but it also means you can't use COM1 and COM3 or COM2 and COM4 at the same time, because of the overlapped IRQ levels. To help you select I/O addresses, Figure 1 lists many of the I/O addresses reserved for common plug-in devices (such as serial and parallel ports) and system board components (such as DMA and interrupt controllers). It's not all-inclusive; I/O maps vary according to differences in architectures. But by avoiding I/O addresses you know are already assigned, you can increase your chances of getting it right the first time when you install a new adapter. Similarly, Figure 2

SUGGESTED IRQ ASSIGNMENTS	
Level	Device
IRQ0	Reserved for system timer
IRQ1	Reserved for keyboard
IRQ2	Reserved for INT line from slave interrupt controller on systems with dual interrupt controllers
IRQ8	Real-time clock
IRQ9	Redirected to IRQ2
IRQ10	Unassigned
IRQ11	Unassigned
IRQ12	Mouse
IRQ13	Math coprocessor
IRQ14	Fixed disk controller
IRQ15	Unassigned
IRQ3	Serial port COM2 (and COM4)
IRQ4	Serial port COM1 (and COM3)
IRQ5	Fixed disk controller or parallel port LPT2
IRQ6	Floppy disk controller
IRQ7	Parallel port LPT1

Figure 2: IBM's suggested IRQ assignments, listed here in order of priority. PCs and XTs support only eight interrupt levels, IRQ0 through IRQ7. ATs and PS/2s support all 16. The design of the interrupt controller subsystem causes IRQ levels 8 through 15 to have higher priority than levels 3 through 7.

lists the IRQ assignments suggested in IBM technical references. Trying to abide strictly by this list presupposes living in an ideal world, for it's not always possible to assign devices these IRQ levels. A mouse, for example, is listed under IRQ12. But the jumper settings on most bus mouse adapters don't offer IRQ12 as an option. In reality, your best bet is to assign it an IRQ level that's otherwise unused in your system and to maintain a list of the known IRQ assignments for your PC.

FASTOPEN AND SMARTDRIVE

I'm currently using an IBM Model 70 with DOS 4.01 installed. I use both FASTOPEN and SMARTDrive (the disk-caching program that comes with *Windows*) to speed up my hard disk. But I'm not really sure: Am I gaining anything by running FASTOPEN and SMARTDrive together? Do their functions overlap enough so that running both in the same system is redundant?

Charles R. Palmer
Lafayette, Louisiana

PC No, they're not redundant. SMARTDrive caches sectors read in from disk so that if the same sectors are again requested, they can be delivered from fast RAM rather than from

RESERVED I/O ADDRESSES	
Hex address	Device
000-01F	DMA controller 1
020-021	Interrupt controller 1
040-047	System timers
060-064	Programmable Peripheral Interface (PPI) controller and keyboard
080-087	DMA page registers
089-08F	DMA page registers
090	Central Arbitration Control Point (PS/2s)
0A0-0A1	Interrupt controller 2 (ATs and PS/2s)
0C0-0DF	DMA controller 2 (ATs and PS/2s)
0F0-0FF	Math coprocessor
100-107	Programmable Option Select (PS/2s)
200-20F	Game port
278-27B	Parallel port LPT3
2E8-2EF	Serial port COM4
2F8-2FF	Serial port COM2
320-32F	Hard disk drive controller
378-37B	Parallel port LPT2
3B0-3BF	IBM monochrome display and printer adapter
3B4-3DA	IBM EGA or VGA video adapter
3BC-3BF	Parallel port LPT1
3D0-3DF	IBM CGA video adapter
3F0-3F7	Floppy disk drive controller
3E8-3EF	Serial port COM3
3F8-3FF	Serial port COM1

Figure 1: Not every device uses the entire range of I/O addresses listed here; however, this should serve as a general guideline for assigning I/O addresses to other devices in your system. Note that the I/O addresses listed for COM3 and COM4 may vary, since there is no true standard defining their locations.

Tutor

the slower physical disk. SMARTDrive works purely at the sector level; it neither understands nor cares about the concept of files, which in one sense are logical (if disjoint) groupings of sectors on the disk.

FASTOPEN, by contrast, works at the file level to speed disk accesses. When DOS searches for an executable in response to a command you type on the command line, it searches the list of directories in the PATH. This search can be time-consuming. To compensate, FASTOPEN installs a TSR that caches filenames and starting cluster numbers. When it performs a search, DOS looks to the FASTOPEN cache first and to the PATH second. If an entry for the file is found by FASTOPEN, access to the file is almost instantaneous, because the starting cluster number (the information DOS needs in order to read the file from disk) is immediately available.

The DOS 4.0 version of FASTOPEN goes even further. It accepts an optional *file extent* parameter (for example, the 20 in FASTOPEN C:=10,20) that enables FASTOPEN to cache not only the starting cluster number for a file, but additional cluster numbers in the allocation chain as well. This presumably speeds things up even more by eliminating accesses to the disk's file allocation table. However, early indications are that DOS 5.0's FASTOPEN command will not include file extent caching among its options.

The difference between sector buffering and filename caching should be obvious. FASTOPEN doesn't cache 512-byte sectors like SMARTDrive does. It caches file information. The bottom line is that it's beneficial to have *both* installed in your system. If you don't use either of them (and if you have memory to spare—FASTOPEN doesn't need much, but SMARTDrive does), try them. You'll be amazed at how fast your hard disk operates.

ASK THE TUTOR

The Tutor solves practical problems and explains techniques for using your hardware and software more productively. Questions about DOS and systems in general are answered here. To have your question answered, write to Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload it to PC MagNet (see page 8 for access instructions). ■

Haven't You Heard the News?



You don't have to buy the whole newsstand to get copies of your latest article or review. Order customized reprints from Ziff-Davis Publishing Co. and let potential clients read all about it.*

To find out how you can have your article or review reprinted, contact Claudia Crichlow—Reprints Manager; Ziff-Davis Publishing Company, One Park Ave., New York, NY 10016, 212-503-5447 or 212-503-5412. * Minimum quantity 500 reprints.

UDS puts Sync-Up modem software support at your fingertips



Superior software support is one of the many reasons why Sync-Up™ emulator/modems, by UDS, have become the industry-wide choice for remote micro-to-mainframe, micro-to-mini and micro-to-micro communication solutions.

Leading software publishers, writing for today's (and tomorrow's) most popular applications — that's the combination that has brought Sync-Up to the forefront of remote PC communications. Consider these applications, and the software houses that support them:

- **TAX FILING**—CPAid; Nelco; Tax\$imple; Teletax
- **EDI**—Scheme Software Corp.; Edwin Systems; CTI; Fortell
- **REMOTE ACCESS**—Triton Technologies; NSA; SoftKlone; CRG (Blast)
- **3270 EMULATION**—CQ Computer Communications; NSA; Attachmate; Black Box; Sterling Software
- **5250 EMULATION**—CQ Computer Communications; Black Box; Emerald
- **X.25**—Microdyne; NSA
- **UNIX, XENIX, AIX**—The Santa Cruz Operation; Cleo; Serengeti Software
- **REMOTE JOB ENTRY**—CQ Computer Communications; Serengeti Software; Eastham Assoc.; Sterling Software; Barr Systems; NSA; Black Box; Cleo
- **APPC/LU6.2**—NSA

For information about specific packages available from these and other outstanding software suppliers, consult our Sync-Up product management team. Contact UDS, 5000 Bradford Drive, Huntsville, AL 35805-1993. Telephone 205/430-8000; FAX 205/430-8926.

CIRCLE 367 ON READER SERVICE CARD



by
Frank J. Derfler, Jr.

Connectivity

MANAGING USERS

I'm responsible for managing the privilege and directory structures on a 75-person Novell network. A recent change in the Novell operating system software has made my job impossible.

When Novell updated the software from Version 2.12 to 2.15, the rights allocation changed so that anyone with file Delete rights to a subdirectory automatically obtained parenting rights in that subdirectory. Since users need file Delete privileges to their in-boxes, they have unlimited freedom to create a maze of subdirectories below the in-box. And that's just what they've done. Policing it could occupy all my time. Do you know of any way to control this situation other than periodic search and destroy missions (not feasible) or taking a step back to the earlier version (also not feasible)?

Paul Sorr
New York, New York



I assume that your complaint concerns users creating multiple subdirectories and filling up the hard disk drive with programs and data files. No matter how much storage space they have, people always need more and they'll apparently find it anywhere they can.

I suggest that you use the *NetWare Syscon* utility to limit the amount of disk space each authorized user is allowed to access. Syscon allows you to do this on a per-volume basis, so if your mail system is on one volume, you can set exacting limits. You should be sure not to cut the users short on disk storage space for their legitimate needs, but you can certainly stop them from abusing disk space. If *NetWare* doesn't allow them to use much more disk space than they really need, the users can have a full slate of privileges and still not abuse the storage space.

CROSSTOWN COMPUTING

I'm a health care professional in a group practice and I've personally computerized our two offices. One office is running

- **MANAGING USERS:** Limiting available disk space limits abuse.
- **CROSSTOWN COMPUTING:** Two ways to share data between separate locations.
- **SEEING DOUBLE:** Here's a way to connect two screens and keyboards to the same PC.
- **CONNECTING NETWORK PRINTERS:** Environment variables make it easier to share resources.
- **LONG-DISTANCE CONNECTIONS:** Don't give up a good solution to save a few dollars!

Novell's *ELS NetWare* with two ATs acting as a nondedicated server and client workstation. The other office uses a single PC. Both employ the same software. They are about 12 miles apart, and I'd like to know how to share data between them.

Robert A. Engl
Niagara Falls, New York



Any way you look at it, you're going to have to buy two modems and another computer, and you'll have to add a telephone line at both offices. You have two good alternatives, remote control and multiuser DOS. If you choose remote control, you can put a cheap AT clone on the LAN, add modem remote-control software (see *PC Magazine* June 12, 1990, "The Next Best Thing to Being There") and remotely control it from the office with the single PC through the modems and a dial-up

telephone connection. This should work well, but you'd do even better if you buy a 386SX to dedicate to the increased file server chores.

You're also an excellent candidate for a multiuser DOS system. Many products, including *Concurrent DOS* from Digital Research, *PC-MOS Multiuser* from the Software Link, and *386/Multiware*, to name just three, will allow all of your PCs to share files and programs running on a PC with a 386 processor. The single PC would operate as a terminal to the PC running the multiuser DOS operating system and your applications. Again, you'd connect over the modems and a dial-up telephone line. This solution wouldn't force you to discard the *ELS LAN*, but I'll bet you'll like the performance of the multiuser DOS system even better.

SEEING DOUBLE

I've got to set up a system where two screens show the same video and two keyboards can make updates to the information displayed. I could link two computers across a LAN, but this seems like overkill. Isn't there a less expensive, less complex way to handle the job? We want to use *Windows* for the application, so the screens should be color VGA.

Jay Lewis
Washington, D.C.



You didn't specify how far apart the screens and keyboards will need to be, but if they're less than 500 feet from each other, Support Systems International offers an excellent solution. This company markets a device called *Station Doubler* that allows two keyboards and screens to share the same PC from up to 500 feet away. The little box has connections for all the cables, is transparent to all software, and works with VGA (of course, both monitors must be of the same type).

Only one keyboard can be in control at a time, but the switchover is fast and automatic: you simply start typing to gain

Connectivity

control. You can show the same screen on both monitors all the time or blank one monitor when the other is in control.

The basic *Station Doubler* retails for \$395, allowing remote access from up to 150 feet. The remote receiver, which extends coverage out to 500 feet, retails for \$150. In addition, you'll need cables and the extra keyboard and monitor, but this is still an economical solution for many people who need to access a program from a couple of different locations. Contact Support Systems International at 415-233-8888.

CONNECTING NETWORK PRINTERS

Our office runs on a *NetWare* 3.1 network. We have several PCs shared among several users, and many of the PCs have printers attached. We wanted to share the printers on the network, but we had problems combining a general user login script with specific printer sharing capabilities. Our objective was to connect the workstation printers as network printers at power-on—independently of the user's ID.

Our solution is simple and doesn't add any software. First, create a user named `PRINTER_CHECK` and then create the login script in Figure 1 for that user name.

The 16-digit alphanumeric labels in the login script are the Ethernet addresses of the adapter cards in each station. We use these addresses to branch to the correct remote printer `rprinter` command. Of course, you must create an `AUTOEXEC.BAT` file in each workstation to generate a login to the `PRINTER_CHECK` user name, as follows:

```
F:
LOGIN PRINTER_CHECK
LOGIN
```

LOGIN SCRIPT FOR USER NAME PRINTER_CHECK

```
IF P_Station = "0123456789ABCDEF" then
  $rprinter {print_server} {printer_number} -r
  $rprinter {print_server} {printer_number}

end
IF P_Station = "ABCDEF0123456789" then
  $rprinter {print_server} {printer_number} -r
  $rprinter {print_server} {printer_number}
end
$logout
```

Figure 1: This login script uses workstation addresses to connect the correct remote printer.

The `AUTOEXEC.BAT` file logs the PC into the network as `PRINTER_CHECK`, runs the user login script to identify the specific PC by adapter number, creates the appropriate remote printer, and returns the PC to the `LOGIN` screen. It's easy and it works.

Keith Mueller
Long Beach, California



We've printed several examples of using the `IF P_STATION` command to customize the environment for *NetWare* users, and this is another good one. It's also a good time to point out that you can do the same kind of customization under another popular LAN operating system: *LANtastic*.

LANtastic uses DOS environment variables to hold a number of predefined macros, one of which is `! "NODEID"`. This macro takes the first eight characters of the adapter address of a station attached to a PC acting as a server and stuffs them into any DOS environment variable you name. For example, the following commands load eight characters of the station ID into an environment variable called `F`, which you can use in batch files:

```
SET NODE = ???????? (Reserves 8
characters in the environment)
NET STRING F ! "NODEID"
```

From this point on, you can test the contents of `F` in your batch files and take specific actions to configure the incoming station in any appropriate way. So while `IF P_STATION` is popular with Novell network administrators, administrators of *LANtastic* networks have equally powerful tools they can use to customize the environment.

LONG-DISTANCE CONNECTIONS

We currently have a leased data line with a 9.6-kilobit-per-second modem at each end, connecting our offices in Los Ange-

les and Houston. We use the line to access the Houston mainframe, with our PCs emulating dumb terminals. The problem is that the line costs about \$1,000 a month. We used to use a dial-up line, which was a hassle and very expensive. Since we use it most of the day, the leased line is probably cheaper than dial-up. Are there any alternatives that would provide good service at lower rates?

Do you think ISDN might be a good idea? Or what about changing companies? We lease the line from Southwest Network, which gets the long-distance line from some other long-distance carrier. Are there any companies that are more competitive?

Harold Monroe
(via CompuServe)



I can think of about a dozen replies to your questions, all beginning with "You might try..." But the first important question is, "Does your present leased circuit work well?" I know you're after economy, but in telecommunications, the phrase, "If it ain't broke, don't fix it!" takes on a special meaning. Proceed very slowly before abandoning a satisfactory service just to save a few bucks.

ISDN is out of the question—the acronym truly does stand for It Still Don't Network—and I can't comment on the use of a public data network like Tymnet or Telenet without a lot more information about your traffic flow.

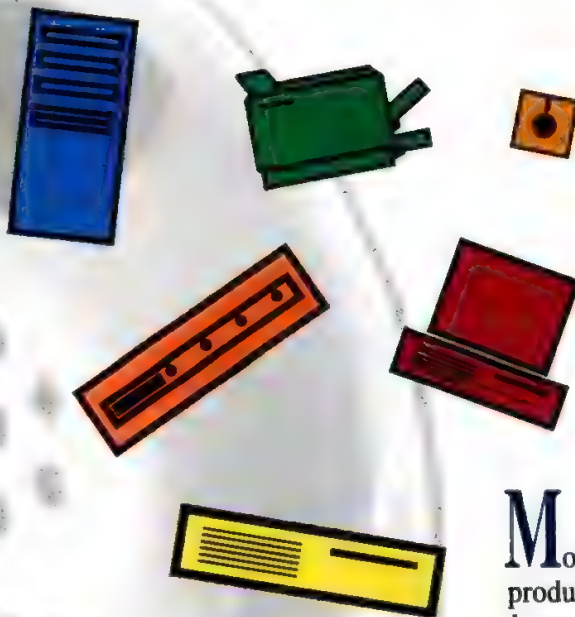
As a simple piece of research, call AT&T, MCI, US Sprint, and any other long-distance carriers you know of for a quote. But you'll need to ask them when they can deliver the service and if they can arrange to bring in the circuit from their service point.

If you get a much better quote, give the company a try. But don't plan on canceling the existing service until many, many months after the promised delivery date.

NETWORK YOUR QUESTIONS

Connectivity gives you practical solutions to networking problems of all types. We'll pay \$50 for any tip we print. Please submit your letter on a disk along with a printout. Then mail your contribution to Connectivity, *PC Magazine*, One Park Avenue, New York, NY 10016, or you may contact Frank J. Derfler, Jr., via MCI Mail (be sure to use Derfler's box named PC MAGAZINE LAN LABS). We are unable to answer letters individually. ■

PC Magazine's Direct Marketing Connection for PC Products and Services



Most of you buy PC products and services through direct marketing channels. In fact, in a recent study of subscribers, 83% said they bought PC products from direct marketers.*

You buy direct because you know exactly what you need and you seek good value and fast delivery.

The following special section connects you with the direct marketers who are eager to please you. By having them all in one place, you can quickly zero in on what you need and which vendor you want to call.



JUST FOR BUYERS WHO MEAN BUSINESS.

FastData 386 Systems



FastData 386/33 **\$2399**

The fastest 386 processor available combined with a 64K thirty nanosecond memory cache make the FastData 386/33 a power users dream! Included in the base price is a 100 megabyte 20 millisecond hard disk, 1024 by 768 VGA monitor and card, four megabytes of memory, and 5.25" & 3.5" high capacity floppy drives. Plus, should anything ever go wrong with your FastData computer, you are covered by a one-year warranty with free on-site service or system replacement if we cannot correct the problem with our FastSHIP advance parts replacement program.

Standard Features

- ✓ 33mhz Intel 386-DX processor.
- ✓ 64K high-speed memory cache.
- ✓ 4 megabytes RAM.
- ✓ 100 mb 20ms IDE hard disk, 1:1 interleave.
- ✓ 1.2mb 5.25" and 1.44mb 3.5" floppy drives.
- ✓ Full size (shown) chassis with keylock, speed and reset buttons.
- ✓ 387-DX coprocessor socket.
- ✓ 230 watt power supply
- ✓ 14" Super VGA color monitor, 1024x768 resolution, with 16 bit VGA card with 512K.
- ✓ Clock calendar, parallel port, game port and two serial ports.
- ✓ Keytronics 101 key keyboard.
- ✓ 8 expansion slots & 5 drive bays.
- ✓ Full Shadow RAM and LIM 4.0 EMS support.
- ✓ Windows & Mouse add \$99.
- ✓ FCC Class B approved.

System Price	65mb	80mb	100mb	200mb
Monochrome	\$1,799	\$1,929	\$1,999	\$2,499
VGA Color	\$2,099	\$2,229	\$2,299	\$2,599
VGA 1024	\$2,199	\$2,329	\$2,399	\$2,699



FastData 386/25 **\$1999**

The optimum combination of features, expandability, and power make the FastData 386/25 an ideal choice for those whose applications demand high speed 32 bit processing and expandability. The value of the 386/25 goes far beyond its price; it comes configured with a full four megabytes of fast RAM, a quick 22 millisecond 65 megabyte hard disk, and maximum VGA displaying 1024 by 768 resolution powered by a high-output 16 bit 512K VGA board. Also, the FastMicro team will configure your FastData 386 exactly the way you want, without sending you shopping elsewhere.

Standard Features

- ✓ 25mhz Intel 80386-DX.
- ✓ 4 megabytes of zero wait-state RAM.
- ✓ 65 mb 22ms RLL hard disk, 1:1 interleave.
- ✓ 1.2mb 5.25" or 1.44mb 3.5" floppy drive. (For both add \$69)
- ✓ Standard chassis (shown on left) with keylock, speed and reset buttons.
- ✓ 80387-DX coprocessor socket.
- ✓ 200 watt power supply
- ✓ 14" Super VGA color monitor, 1024x768 resolution, with 16 bit VGA card with 512K.
- ✓ Clock calendar, parallel port, two serial ports, and game port.
- ✓ Keytronics 101 key keyboard.
- ✓ 8 expansion slots & 5 drive bays.
- ✓ Full Shadow RAM and LIM 4.0 EMS support.
- ✓ Windows & Mouse add \$99.
- ✓ Guaranteed compatible.
- ✓ FCC Class B approved.

System Price	65mb	80mb	100mb	200mb
Monochrome	\$1,599	\$1,729	\$1,799	\$2,099
VGA Color	\$1,899	\$2,029	\$2,099	\$2,399
VGA 1024	\$1,999	\$2,129	\$2,199	\$2,499



FastData 486/25

Call about our hot new 486, just \$3,199 with the same standard features as our 386-33 system. Includes a 128K two-stage cache and is expandable to 64mb of memory.

All FastData Systems Include:

- 30 day money-back guarantee
- Toll-free technical support for life
- One year warranty with on-site service available to most U.S. locations

FastData SX Systems



\$1599 FastData SX/20

25% faster than a 16mhz SX, the FastData SX/20 adds even greater performance to its 386 multitasking capabilities. Just \$200 more than our SX/16, this machine also includes a second floppy drive in addition to the standard VGA color monitor and 16 bit VGA adaptor, Keytronics keyboard and 40 megabyte hard drive. The system includes two megabytes of memory and is expandable to eight on the main system board. Remember, when you have questions, need to solve a problem, or want recommendations on products for your system, the FastMicro team is standing by toll-free to provide product support for as long as you own your FastData personal computer.

Standard Features

- ✓ 20mhz Intel 80386-SX processor.
- ✓ 2 megabytes of zero wait-state RAM.
- ✓ 40 mb 28ms IDE hard disk, 1:1 interleave.
- ✓ 1.2mb 5.25" and 1.44mb 3.5" floppy drives.
- ✓ Standard chassis (shown) with keylock, speed and reset buttons.
- ✓ 200 watt power supply
- ✓ 14" VGA color monitor with 16 bit VGA card with 256K.
- ✓ Clock calendar, parallel port, two serial ports, and game port.
- ✓ Keytronics 101 key keyboard.
- ✓ 8 expansion slots, 5 drive bays.
- ✓ 80387-SX coprocessor socket.
- ✓ Full Shadow RAM and LIM 4.0 EMS support.
- ✓ Windows & Mouse add \$99.
- ✓ Guaranteed compatible.
- ✓ FCC Class B approved.

System Price	40mb	65mb	80mb	100mb
Monochrome	\$1,299	\$1,369	\$1,499	\$1,569
VGA Color	\$1,599	\$1,669	\$1,799	\$1,869
VGA 1024	\$1,699	\$1,769	\$1,899	\$1,969



\$1399 FastData 386/SX

Combine the benefits of an advanced Intel 386 processor, the value of a 286 and the advantages of FastData and you've got the FastData 386/SX! This machine is the choice of those who want to run today's powerful 386 and multitasking software, like Windows, and also want to run their favorite DOS applications at surprising speeds. We've made our customers' favorite options standard: it comes with an ample two megabytes of memory, a high performance 40mb hard drive, and 16 bit color VGA. Compare performance, features, and service and you will find no better SX value. Interested further? Try the FastData 386/SX for 30 days; you have to be happy - if not, we'll take it back.

Standard Features

- ✓ 16mhz Intel 80386-SX processor.
- ✓ 2 megabytes of zero wait-state RAM.
- ✓ 40 mb 28ms IDE hard disk, 1:1 interleave.
- ✓ 1.2mb 5.25" or 1.44mb 3.5" floppy drive. Both drives add \$69.
- ✓ Standard chassis with keylock, speed and reset buttons (mini desktop shown - add \$50).
- ✓ 200 watt power supply
- ✓ 14" VGA color monitor with 16 bit VGA card with 256K.
- ✓ Clock calendar, parallel port, two serial ports, and a game port.
- ✓ Keytronics 101 key keyboard.
- ✓ 8 expansion slots, 5 drive bays.
- ✓ 80387-SX coprocessor socket.
- ✓ Full Shadow RAM and LIM 4.0 EMS support.
- ✓ Windows & Mouse add \$99.
- ✓ Guaranteed compatible.
- ✓ FCC Class B approved.

System Price	40mb	65mb	80mb	100mb
Monochrome	\$1,099	\$1,169	\$1,299	\$1,369
VGA Color	\$1,399	\$1,469	\$1,599	\$1,669
VGA 1024	\$1,499	\$1,569	\$1,699	\$1,769

FASTMICRO

For information or to order call:

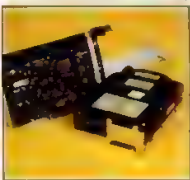
1-800-441-FAST

CIRCLE 352 ON READER SERVICE CARD

Hardware

DISK DRIVES

Colorado DJ-10 40-120mb Int. Tape	249
DJ-20 80-240mb Int. Tape	319
Conner (see IDE controllers below)	
CP3044 40mb IDE 28ms	269
CP3104 100mb IDE 25ms	499
CP3208 200mb IDE 25ms	849



Seagate 89mb AT Kit
\$399 IDE performance, big 89 megabyte capacity and Seagate quality make this kit a great buy. A 19ms access time and 5 mbps transfer rate assure great performance. Controller, cables and rails are included to make installation fast and easy.

Micropolis	
MC1664 340mb ESDI 14ms	1295
MC1598 1.2gb SCSI 14ms	2895
NEC CDR-3501 Ext. CD-ROM w/interface	549
Plus Development	
HardCard IXL 50 - 52mb 9 ms 16bit	399
HardCard IXL 105 - 105mb 9 ms 16bit	679
Impulse 42mb 12 ms 16bit IDE Kit	399
Impulse 105mb 9 ms 16bit IDE Kit	599

Toshiba 1.44mb Floppy Drive

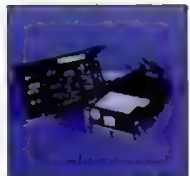
Complete with mounting brackets and installation instructions, this Toshiba works in all true 286 & 386 compatibles. Will also read/write/format 720K 3.5 disks. Rails, add \$5.



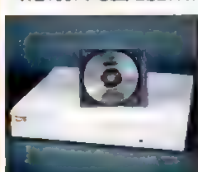
Seagate	
30MB XT Kit ST238 w/ cont.	249
40MB AT ST251-1 MFM Drive	239
40MB AT ST157A 28ms IDE Drive	199
80MB AT ST296N SCSI Drive w/adaptor	349
89MB ST1102A 19ms IDE Drive	359
125MB ST1144A 19ms IDE Drive	469
210MB ST1239A 15ms IDE Drive	799
330MB ST2383E 16ms ESDI Drive	1289
Teac	
1.2MB 5.25" Floppy	65
1.44MB 3.5" Floppy	65

Toshiba \$489 100mb IDE Kit

Upgrade your 286 or 386 to IDE technology and Toshiba quality at a FastMicro price. This kit comes with a fast 20ms 105mb drive and built-in 1:1 controller. 16 bit IDE card with dual floppy controller and cables. 5.25 brackets and rails. Call our experts for all your drive needs. Model MK234FC



Toshiba	
360K 5.25" Floppy (Black)	69
1.2MB 5.25" Floppy	69
1.44MB 3.5" Floppy	69
65mb MK134 22ms RLL drive	279
100mb MK234FC IDE 3.5" drive	449
Western Digital	
WD 16 bit IDE Host - with dual floppy controller	39
WD93044 40mb IDE 28ms	199
WDAC280 80mb IDE 28ms	339
WE1007V-SE2 ESDI AT 1:1 dual controller	149



Sun Moon Star CD-ROM Drive

\$549 Affordable CD-ROM technology is here! This player reads over 600mb from just one CD and can even play your favorite audio CDs. Using a high quality Hitachi mechanism, it comes with a cable, interface and 18 month warranty. Add an Illustrated Encyclopedia CD for \$49

BOARDS

Artisoft/Lantastic	
Lantastic 2mbps Starter Kit - Two Station	369
Lantastic 2mbps Adaptor	169
Lantastic Ethernet Starter Kit - Two Station	499
Lantastic Ethernet Adaptor	239



ATI VGA Wonder+ \$189

New and improved, the ATI VGA WUNDER+ is faster than VRAM. It does interlaced and non-interlaced 1024x768 modes, is 100% register compatible, and comes with extensive software drivers. A free mouse is included as an added bonus. 512K version \$219

ATI	
2400 ETC Internal	Call
2400 ETC External	187
9600/E External MNP V.42bis	479
VGA Basic 16	75
VGA Wonder + 256K	189
VGA Wonder + 512K	229
Brown Wagh Sound Blaster	149

Everex	
2400B Int Modem	99
EGA 480 Card	69
RAM3000 16 bit RAM card	75
RAM8000 16 bit RAM card	169

Hayes	
JT FAX 4800B Internal	139
Personal Modem 2400 w/Prodigy	119
Hercules Graphic Card +	169

Intel	
Classic 2400 Modem Int./Ext.	137/167
Satisfax Classic - Internal 9600	379
8087-2	115
287XL	199
387-DX25	479
387-SX16/20	319/349

Logitech	
ScanMan Plus	165
Scanman 256	289
Orchid	
ProDesigner II 512/1mb	279/329
Tiny Turbo 286	207
Tiny Turbo Xtra	267

Practical Modem \$449

9600SA
 This external modem features V.42 and MNP error correction combined with MNP/5 and V.42 bis data compression to provide total high speed throughput. The PM9600SA is also V.32 TCM, V.32, V.22 compliant and comes with a five year guarantee



Paradise	
Basic VGA - 8 bit	109
VGA 1024 256K/512K	175/199

Practical Peripherals	
2400B Int Modem	125
2400B Int with MNP	169
PM9600SA Ext. V.32/V.42bis	449

Prometheus	
Promodem 2400B Internal	98
Promodem 2400G External	149

USRobotics	
2400 Sportster Int/Ext.	119/147
2400 Sportster Int/Ext.	159/199
Couner HST 14,400 /Int.Ext.	539/579
Couner HST 14,400 Dual Standard Ext.	859

Video 7	
VGA 1024i 256K	179
VGA 1024i 512K	209
V-RAM VGA 512K	299

ZOOM	
HC2400 Internal	79
2400 V.42bis External Modem	169
9624 Send/Receive Internal Fax Modem	129

FastData 286/12 \$799

Imagine a fast 286 computer at a super price and you've got the FastData 286/12. This system is complete, not stripped. You get one megabyte of zero-wait-state memory and a 28ms IDE hard disk - standard. Also included is an amber monitor and graphics card, your choice of a high density 1.2mb or 1.44mb floppy drive and a Keytronics keyboard. And since it's a FastData, you are backed with toll-free technical support, one year warranty with the FastShip replacement program & on-site service plan, and our 30 day full money back satisfaction guarantee!

- ✓ 12mhz 80286 processor.
- ✓ 1 megabyte RAM.
- ✓ 40 mb 28ms hard disk 1:1 interleave.
- ✓ 1.2mb 5.25" or 1.44mb 3.5" floppy drive (2nd drive add \$69)
- ✓ Standard chassis
- ✓ Five drive bays.
- ✓ 200 watt power supply.
- ✓ 287XL coprocessor socket
- ✓ Monochrome monitor with monochrome graphic board.
- ✓ Clock calendar, parallel port, and two serial ports.
- ✓ Keytronics enhanced 101 keyboard.
- ✓ 8 expansion slots, 6 available.
- ✓ Full documentation.
- ✓ FCC Class B approved.



System Price	40mb	65mb	80mb	100mb
Monochrome	\$799	\$899	\$999	\$1,099
VGA Color	\$1,099	\$1,199	\$1,299	\$1,399
VGA 1024	\$1,199	\$1,299	\$1,399	\$1,499

MONITORS

Mitsubishi	
1410 EGA	325
Diamond Scan 1381	479
NEC	
Multisync 2a	469
Multisync GS 2a	199
Multisync 3d	629
Multisync 4d	Call
Panasonic C1381 VGA	439
Princeton	Call
Seiko CM1440/1450	519/659
Sony 1304 Multiscan	669
Zenith 1492	Call

FastData Products

FastData 16 Bit VGA

The FastData 16bit VGA card features 256K of video memory, does CGA, EGA, & VGA up to 1024x768 and comes with drivers for popular software including Windows 3.0 It's expandable to 512K and has a 30 day money-back guarantee.



FastData 16bit 1mb VGA	159
FastData CGA Card	35
FastData MGP Card	29



FastData 2400 Baud Internal Modem

\$69 The FastData 2400 baud internal modem is fully Hayes compatible and can be configured to COM port 1-4. It has an internal speaker, is auto answer & auto dial, and comes with BitCom software.

9600B SendFax w/ 2400B Modem	99
MFM 16 Bit 1.1 Hard/Floppy Disk Cont	59
Parallel/Dual Serial/Game Card	29
RLL 16bit 1.1 Hard/Floppy Disk Cont.	69
XT 1.44 Dual Floppy Controller	35

FastData Monitors

Your best value, we have a complete line made for us by leading manufacturers like Samsung & Hyundai. Like all FastData products, you have a full 30 day money back guarantee. Shown is the VGA Color for \$279



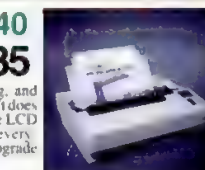
FastData Monitors	
12" Amber Monochrome	79
14" Amber Monochrome	109
14" White Monochrome	109
14" White VGA Monochrome	129
14" CGA Color 52 dot pitch	199
14" VGA Color 39 dot pitch	269
14" VGA Color 31 dot pitch	319
14" Super VGA 1024 x 768 28 dp	349

PRINTERS

Canon BJ10E	319
BJ300/BJ330	495 Call

Citizen GSX140

Loaded with features, this 24 pin printer is a hot seller! It comes with 6 resident fonts, paper parking, and Epson & IBM printing modes. It does up to 192 CPS and has a unique LCD control panel that lets you set everything without DIP switches. Upgrade to color anytime for just \$39



Citizen	
200GX	189
GSX140 / GSX145	285/395
Fujitsu DL3400	359
NEC	
P3200	269
P3300	369
P6200	469
P6300	629
OKIDATA Okilaser 400	669

NEC Silentwriter 2 Model 90 \$1595

PC Magazine's editor's choice! The new NEC model 90 comes with 2mb of memory, Postscript by Adobe with 35 fonts, and parallel, serial and AppleTalk interfaces. All this and 6 ppm speed, an easy-to-use LCD operator panel and letter, legal, & envelope feed.



Panasonic	
KXP1180	155
KXP1123	Call
KXP1624	429
KXP4420 Laser	829
KXP4450/4455 Lasers	Call
Seiko Smart Label Printer	167
Star	
NX1001	149
NX1500	299
NX2410	249
NX2410 / 2415	429 / 569
Texas Instruments Microlaser PS17	1199
Microlaser PS35	1499

Software



DATABASE & FORMS

askSam 5.0	209
Avery List & Mail Plus	37
Clarion Personal Developer	45
Clarion Professional Developer	449
Clipper 5.0	489
DataEase	459

Personal R:Base \$89

Who says powerful relational databases are expensive. Not with the new easy-to-use Personal R:Base. It has initial...

dBase III+	439
dBase IV	479
dBXL Diamond	129
Formbase	299
FormTool Gold	52
Formfiller	85
Formbase Plus	177
FoxPro	417
Paradox 3.5	489
Per Form Designer & Filler	95
Personal Rbase	89
Q & A	214
RapidFile	99
Rbase for DOS	447
Reflex	159

DESKTOP PUBLISHING

Adobe Postscript Cart. for HPLJ-II	279
db Publisher Professional	389
GEM Desktop Pub	159
Pagemaker 4.0	489

Corel Draw Version 2.0 \$359

Winner of all the top awards, Corel Draw gives you more for your money. It runs under Windows & includes incredible drawing and editing tools. Includes over 100 typefaces and 300 pieces of clip art. Corel Draw converts scanned art to smooth vector images in seconds. This is the most complete illustration package we've ever seen!

PFS First Publisher	89
Printshop	33
Publisher's Paintbrush	149
Publish III	135
Ventura Publisher Gold / Windows	539

FINANCIAL

ACCPAC BPI Value Pak	359
Bedford Integrated Acct	119
DAC Accounting 4.1	79
DAC Bonus Pack 4.1	119
DAC Payroll 4.1	57
Dollars & Sense	98

Peachtree Complete III \$139

A super value! Includes General Ledger, Accounts Payable, Accounts Receivable, Invoicing, Purchase Order, Payroll, Inventory, Job Cost, Fixed Assets and more. Loaded with over 450 reports, automatic backup and helpful manuals.

Macintosh 1040 for Windows	57
Managing Your Money	125
Money Matters	49
One Write Plus G/L, A/P & A/R	165
Peachtree Complete III	139
Peachtree with Data Query	209
Quicken	36
Taxview 1040 Prof. for Windows	299
Turbo Tax Personal 1040	39
Turbo Tax Professional	209
Wealth Builder	129

GRAPHICS

Autosketch 3.0	139
Corel Draw 2.0	359
Design CADD 3-D	185
DrawPerfect	265
Freelance Plus	307
Genenc 3D Drafting	199
Genenc Cadd Level 2 Starter Kit	95
Genenc Cadd 5.0	279
Harvard Graphics	299
PC Paintbrush IV Plus	109
Perspective Jr	69
PFS First Graphics	89

\$115

GeoWorks is the entry level graphical environment that's received rave reviews. Includes GeoWrite word processor & desktop publisher.

GeoDraw, object-oriented drawing package and GeoComm, communications package. Also comes with GeoManager, GeoPlanner and GeoIndex applications. Plus all programs operate with the same point & click simplicity (mouse required).

INTEGRATED

First Choice	95
Framework XE	95
Geoworks Ensemble	115
LotusWorks	89
SmartWare II	417
Symphony 2.2	489
Works	89

MICE/INPUT

Keytronics KB101 Keyboard	59
Keytronics Professional Mouse	59
Logitech Mouseman Serial nighthand	65
Logitech Mouseman Serial w/Windows	127
Logitech Mouseman Bus nighthand	76

Logitech Mouseman Serial \$65

Logitech's MouseMan is the next step in mouse evolution. Specifically tailored in right or left hand versions, it provides the ultimate in comfort and 100% hardware resolution.

Logitech Mouseman Cordless	129
Logitech Trackman Serial	129
Microsoft Serial or Bus Mouse only	83
Microsoft Serial or Bus w/ paint	95
Microsoft with Windows 3.0	147
Z-Nix Serial Mouse w/Windows 3.0	89

PROGRAMMING

Macro Assembler	89
Microsoft C Compiler	303
Borland C++	129
Turbo Pascal	90
Quick Basic	60
Quick C	60
Quick Pascal	60
Windows Developer's Kit	309

SPREADSHEETS

Always	115
Excel for Windows	299
Lotus 1-2-3 version 2.2	325
Lotus 1-2-3 version 3.1	399

Excel 3.0 for Windows \$299

The best graphical spreadsheet now includes 1-w/10 which puts frequently used commands a single mouse click away. New Q & T lets you access remote databases & BestFit automatically resizes columns to display longer cell widths. 3-D charts, clip art support and button macros are included too! Command level on screen help for transitional 1-2-3 users is included too.

Lucid 3-D	53
Quattro Pro 2.0 Competitive Upgrade	89
Supercalc 5D	289

WORD PROCESSORS

Facelift for WordPerfect	57
Grammatik IV	49
LetterPerfect...	119
Multimate 4.0	267
Professional Write	149
Publisher's PowerPak for WordPerfect	45
Rightwriter	58

WordPerfect 5.1 \$239

WordPerfect is the #1 word processing software. It got almost every feature imaginable and set it is easy to use. The current version adds pull down menus, mouse support, table creation and equation editor. Add this to the best software support in the business and you can't go wrong!

Sprint	117
Word	209
Word for Windows	209
Word Perfect 5.1	239
Word Perfect for Windows	Call
Word Perfect Add'l Station	153
Word Perfect Office	79
WordStar Professional	Call
Writer's Toolkit	79

Call On Non-Listed Items

WINDOWS SOFTWARE

Adobe Illustrator	279
Adobe Type Manager	59
Ami	115
Ami Professional	287
Asymetrix Toolbook	279
Bitstream Facelift	57
Corel Draw 2.0	359

Windows 3.0 \$89

Turn your 286 or above with 640K or more of memory into a powerful multitasking workstation that runs even Windows applications. Includes many integrated applications - stand alone Plus! You buy Windows now from FastMicro we'll throw in 10 of the best Windows shareware programs.

DBlast/Windows	239
Excel	309
Form Publisher	139
Grammatik IV for Windows	49
HDC First Apps or Windows Express	46
Micrographix Draw +	149
Micrographix Designer	449
MicroPhone II	199
Microsoft Mouse w/ Windows 3.0	147
Microsoft Office (Word/Excel/Powerpoint)	619
Microsoft Productivity Pack	39
Microsoft Windows Developer's Kit	309
Pagemaker 4.0	489
Per Form Pro	289
Powerpoint for Windows	309
Project for Windows	429
Publisher's Powerpak for Windows	45
Windows 3.0	89
Windows Entertainment Pack	27
WingZ Spreadsheet	309
Word for Windows	299

Adobe Type Manager & Type Align \$109 for both

Adobe Type Manager for Windows brings scalable PostScript fonts to your screen and non-PostScript dot matrix or laser printer. Includes Times, Helvetica, Courier and Symbol font families. New Adobe TypeAlign for Windows works with ATM to create curved, skewed and other special type effects which you can import into other Windows applications.

ENTERTAINMENT & EDUCATION

Bannermania	21
Carmen San Diego Deluxe Edition	45
F-19 Stealth Fighter	38
Hunt for Red October	19
King's Quest 5 (VGA Vers.)	38
Leisure Suit Larry II or III	35
Microsoft Flight Simulator	38
Aircraft & Scenery Designer	27
Microsoft Learning DOS	32
NFL Challenge	35
PC Globe or PC USA	35
Simply	28
Teins	19

FAST MICRO



Call Toll-Free: 1-800-441-3278



TERMS: No Charge for Visa or MasterCard. All orders up to 20 pounds are shipped via Federal Express. Minimum order: \$50. Shipping & handling charge: 3% (Min \$6). Product warranties, offers & claims are handled by the manufacturer*. Compatibility is not guaranteed*. No returns on used items*. All opened returns are subject to 15% restocking fee*. DOA's repaired or replaced at our option. Call for return authorization (RA) number first. Shipping is not refundable. Sorry, no COD's. Personal/company checks delay shipping. AK, HI, & APO addresses add \$15 per box. Prices/availability subject to change. Purchase orders accepted (no added surcharges) from approved corporations only. AZ orders add 6.7% tax. * Excludes FastData products. Mailing Address: 3655 E. LaSalle St., Phoenix, AZ 85040. To place orders call 800-441-3278. For customer service call 602-437-0300.

LAPTOP COMPUTERS

AST Premium Executives 286 & 386. CALL
Compaq all models. SPECIAL
NEC Prospeed all models. SPECIAL
NEC Ultralite 286F. 1689
Packard Bell PB286NB VGA/20MB. 1889
Panasonic CF270. 1849
Sharp PC6220 286/VGA/20MB. SPECIAL
Texas Instrument TM2000. CALL
Texas Instrument TM3000. CALL
Toshiba all models. SPECIAL

COMPUTERS

AST Premium 386SX model 5. 1559
AST Premium 386/25 model 5. 2995
AST Premium 486/25E model 5. 4999
Compaq Deskpro 386S w/80MB. 2249
Compaq Deskpro 386/20e w/40MB. 2749
DTK 286/386/486. custom quotes CALL
Packard Bell all models. CALL
Wyse Terminals 30/50/60. 294/375/298

TAPE BACKUP

Colorado DJ-10. 40-120MB int tape. 245
Colorado DJ-20 120-250MB int tape. 349
Irwin tape drives. ALL MODELS
Maynard 40/60/150MB int/ext. CALL
Mountain 40MB int/ext. 249/CALL

DISK DRIVES

Conner CP3044 40MB IDE. 259
Conner CP3104 105MB IDE. 459
Maxtor LXT213A 213MB IDE. 799
Micropolis 1654/7 161MB ESDI. 849
Plus Hardcard II XL 50MB. 379
Plus Hardcard II XL 105MB. CALL
Seagate ST251-1 40MB MFM. 242
Seagate ST1144A 124MB IDE. 489
Toshiba 1.44MB 3.5" floppy. 79

CD-ROM DRIVES

NEC CD-ROM. ALL MODELS
Toshiba CD-ROM. ALL MODELS

MATH CO-PROCESSORS

Cyrix 80387DX-20. 309
Cyrix 80387DX-25. 389
Cyrix 80387DX-33. 475
Intel 80287XL. 189
Intel 80387SX-16. 288
Intel 80387DX-16. 319
Intel 80387DX-20. 365
Intel 80387DX-25. 449
Intel 80387DX-33. 559
Weitek All Models. CALL

FAX MACHINES

Sharp All Models. CALL
Murata M1100/M1850. 539/775
Panasonic Panafax models. CALL
Canon Faxphone 23. 769
Epson FAX 1000 w/paper cutter. 435



**MIDWEST
COMPUTER
WORKS**

QUALITY SERVICE & GUARANTEED LOWEST PRICES!

PRINTERS

PANASONIC

KXP1180. 149
KXP1123. NEW
KXP1124. 259
KXP1624. 359
KXP1654. NEW
KXP4420 Laser. SUPER
KXP4450i Laser. LOW
KXP4455 Laser. PRICES

NEC

P2200XE. 249
P3200. 269
P3300. 379
P6200. 467
P6300. 625
P9300. CALL
LC90 Postscript. 1589
ColorMate Postscript. CALL

DICOMIX by Kodak

150+. 329
150+ carrying case. 29

OKIDATA

182 Turbo. 227
320/321. 314/439
380+. 284
390+/391+. 439/599
393+. 929
Oki Laser 400. 627

HEWLETT PACKARD

Deskjet 500. 499
Laserjet IIP. 899
Laserjet III. 1579
Laserjet IID/IIID. CALL
Paintjet XL. 979/1795
Scanjet+. 1099
Plotters all models. CALL

CANON

BJ10E Bubblejet. 319
BJ10E carrying case. 29
BJ10E accessories in stock

QUME

Publisher II. 2449
Crystal Express. 3549

STAR

NX1001. 149
NX1020R. 214
NX2420R. 339
XB2410/XB2415. 425/589

QMS

410 Postscript. 2095
Color Postscript. SPECIAL

EPSON

FX-850/FX-1050. CALL
LQ-510. 279
LQ-2550. CALL
DFX-5000. 1389
DFX-8000. 2229

SEIKO

Smart Label Printer. 174

CITIZEN

GSX-140. 295

SOFTWARE

Adobe Type Manager. 59
Adobe Type Manager Plus. 129
Adobe Illustrator. 278
Adobe Streamline. 222
Advanced Revelation. 619
Aldus Pagemaker 4.0. 499
Asymetrix Toolbook. 285
AMI / AMI Pro. 119/289
Bitstream Facelift. 59
Bitstream Facelift Value Pack. 119
Borland Quattro Pro. 319
Calera WordScan Plus. 641
Corel Draw 2.0. 365
Lotus 1-2-3 ver 3.1. 409
Microsoft Windows 3.0. 99
Microsoft Excel 3.0. 295
Microsoft Word for Windows. 295
Microsoft Powerpoint. 295
Precision SuperBase4. 409
Xerox Ventura Gold 3.0. 519
Xerox Formbase. 295

LASERJET ACCESSORIES

Adobe Postscript cart HP II. 279
HP Paper Cassette Trays. IN-STOCK
Pacific Data 25 in 1 cart. 257
Pacific Data Postscript cart HP II/III. 339
Pacific Data memory boards. CALL

SCANNERS

Logitech Scanman 256. 299
Complete PC 1/2 page scanner. 185
Complete PC full page scanner & FAX. 669

MICE

Logitech Dextra 2-button serial. 49
Logitech C9 serial / PS/2. 79
Logitech Trackman. 89
Logitech mouse w/Windows 3.0. 119
Microsoft bus or serial 400 dpi. 89
Microsoft mouse w/windows 3.0. 149

MODEMS

Cardinal 2400 baud int MNP-5. 99
Everex Everfax 2400/9600. 265
Intel Satisfaction Board. IN-STOCK
Megahertz modems for all laptops. CALL

MONITORS

Emerson ALL MODELS. CALL
Goldstar ALL MODELS. CALL
Mitsubishi ALL MODELS. CALL
NEC GS24 14" mono VGA. 205
NEC IIA 14" VGA 800x600. 465
NEC 3D 14" multisync 1024x768. 609
NEC 3DS 14" multisync antiglare. 665
NEC 4D 16" multisync 1024x768. BEST
NEC 5D 20" multisync 1280x1024. PRICE
Packard Bell 8529 14" VGA. 31mm. 297
Packard Bell 8541 14" VGA. 41mm. 274
Packard Bell 8510 14" 1024x768. 349
Panasonic 1381 14" 1024x768. 389
Princeton Ultra-1200/Ultra-1400. CALL
Samsung ML 4571 14" mono VGA. 139
Samsung CT4581 14" 800x600 VGA. 439
Seiko 1440/1450 14" VGA. 25mm. 515/659
Sony CPD1304 14" 1024x768. 25mm. 849
Zenith 1492 14" flat tension VGA. 592

VIDEO BOARDS

ATI VGA Wonder+ w/mouse 256K. 179
ATI VGA Wonder+ w/mouse 512K. 209
Cardinal-200 800x600 8-bit VGA. 88
Cardinal-600 1024x768 16-bit VGA. 159
Hercules Graphics Station 1M/3M. CALL
NEC Graphics Engine 16. 595
NEC Graphics Engine 256. 889
Orchid Pro Design II 512K/1MB. 279/315
Paradise VGA+ / VGA+16. SPECIAL
Paradise 8514/A+. 469
Video 7 1024i 256K/512K. 179/209

MISC

Ad-Lib music card. 119
Soundblaster. 157
Expans data compression board. 149
Keyboards XT/AT. 69

BATTERY BACKUPS

American Power 450. 259
American Power 520. 313
Tripp Lite BC450. 295
Tripp Lite BC750. 465
Tripp Lite Iso Bars. ALL MODELS

NETWORKING

Novell ELS I-4-users. CALL
Novell ELS II 8-users. CALL
Novell Advanced Network 2.15. 1859
Novell Network 386 v3.1. CALL
NE1000/NE2000 Boards. 155/189
Lantastic Ethernet Starter Kit. 515
Tiara, 3Com, Thomas Conrad, Digiboard and
Western Digital. CALL FOR PRICING
SMC Arcnet PC130. 98
SMC Arcnet PC500WS. 179
SMC Arcnet PC500FS. 289
3COM 3C503 Etherlink. 195
3COM 3C523 MCA TP. 330

PACKARD BELL FORCE 1

•286 12MHz 1MB-RAM
•0-wait state memory
•5.25" & 3.5" floppies
•40MB hard drive
•Lotus Works software
•MS-DOS 4.01 & GW-Basic
•1-year on-site warranty

\$985

PACKARD BELL FORCE 386X

•386SX 16MHz 1MB-RAM
•0-wait state memory
•5.25" & 3.5" floppies
•40MB HD (84 & 124MB opt)
•Lotus Works software
•MS-DOS 4.01 & GW-Basic
•1-year on-site warranty

\$1195

DTK 386 25MHz SYSTEM

•386 25MHz 1MB-RAM
•5.25" or 3.5" floppy
•68MB 19MS hard drive
•1024x768 video card
•101 key keyboard
•1-32bit, 5-16bit, 2-8bit slots
•2-ser, 1-par, 1-game ports

\$1699

DTK 386 33MHz SYSTEM

•386 33MHz 4MB-RAM 64K cache
•5.25" or 3.5" floppy
•124MB 19MS hard drive
•1024x768 video card
•101 key keyboard
•1-32bit, 5-16bit, 2-8bit slots
•2-ser, 1-par, 1-game ports

\$1995

Panasonic
Office Automation



KXP-1123

24-PIN DOT MATRIX PRINTER

•High resolution 24-pin printouts
•240cps draft print speed w/10K buffer
•Rear, top or bottom paper feed
•Push and pull tractor
•Auto paper parking & loading feature
•Emulates Epson & IBM
•2-year Panasonic Warranty



CF-270

NOTEBOOK LAPTOP COMPUTER

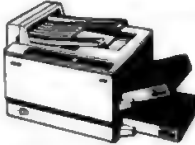
•80286 16MHz w/1MB RAM (max 5MB)
•Crisp 640x480 VGA LCD display
•1.44MB built in floppy
•Fast 20MB hard disk drive
•3-hour rechargeable battery
•12.2" x 10" x 1.73" dimensions
•Only 6.9 lbs w/battery (120V, 50-60Hz)



KXP-4420

PERSONAL LASER PRINTER

•8 pages per minute
•One 250 sheet tray
•300 dpi resolution
•512K RAM (max 4.5MB)
•HP emulation
•22 internal fonts
•1-year warranty



KXP-4450i

LASER PRINTER

•Fast 11 pages/min at 300 dpi
•Two 250 sheet trays
•Individual sheet loading
•512K RAM (max 4.5MB)
•HP & Epson emulation
•28 internal fonts
•1-year warranty



**MIDWEST
COMPUTER
WORKS**

350 Lexington Drive, Buffalo Grove, IL 60089

DIRECT
ORDER
LINE

800-669-5208

CUSTOMER SERVICE 708-459-6883 • FAX 708-459-6933

ORDERS SHIPPED WITHIN 24 HOURS - IF YOU FIND A BETTER PRICE CALL US



•C.O.D. orders accepted
•Your credit card is not charged until the product is shipped
•Personal and company checks will delay order 2 weeks
•Call us for quantity discounts
•Prices subject to change
•We check for stolen credit cards
•Prices reflect a cash discount
•Foreign orders are welcome

JDR Microdevices

2233 Branham Lane, San Jose, CA 95124

BUY WITH CONFIDENCE FROM JDR!

- 30-DAY MONEY BACK GUARANTEE
- 1 YEAR WARRANTY
- TOLL-FREE TECH SUPPORT

MMC

MOTHERBOARDS



16MHz MINI 386-SX \$399⁹⁵

• NORTON SI 15.3 • LANDMARK AT SPEED 20.8

- EXPANDABLE TO 8MB ON BOARD • AMI BIOS • CHOOSE 0 OR 1 WAIT STATE FOR USE WITH SLOWER RAM • FIVE 16 BIT AND THREE 8 BIT SLOTS • CHIPS & TECHNOLOGY NEAT™ CHIPSET • SOCKET FOR 80387 SX CO-PROCESSOR • 8 5" X 13" SIZE FITS MINI-286 & FULL-SIZE 286 CASES

MCT-386SX		\$399.95
MCT-386SX-20	20MHz Mini 386 SX	\$499.95
MCT-M386-25	25MHz Mini 386	\$799.00
MCT-386MBC-33	FULL SIZE 33MHz CACHE 386	\$1195.00
MCT-386MBC-25	25MHz VERSION	\$999.00
MCT-486MB33	33MHz CACHE 486	\$2495.00
MCT-486MB25	25MHz CACHE 486	\$1995.00
MCT-M286-20N	20MHz 286 W/NEAT	\$389.95
MCT-M286-16N	16MHz 286 W/NEAT	\$289.95
MCT-M286-12	12MHz 286	\$199.95

INTERFACE CARDS

1:1 INTERLEAVE FLOPPY/HARD

\$149⁹⁵

- 286/386/486 COMPATIBLE
- SUPPORTS 2 HARD DRIVES
- 2 FLOPPIES (HD, QD, 3D)
- POWER ON DIAGNOSTICS & ERROR CORRECTION

MCT-FAFH		\$149.95
MCT-FDC-HD	2 FLOPPY CONTROLLER	\$49.95
MCT-FDC-HD4	4 FLOPPY VERSION	\$59.95
MCT-HDC	HARD DISK CARD	\$79.95
MCT-RLL	RLL HARD DISK CARD	\$89.95
MCT-AFH-RLL	16 BIT RLL F.H.CARD	\$199.95
MCT-IDEIO	16 BIT MULTI-IDE CARD	\$89.95
MCT-IO	MULTI-I/O CARDS	\$59.95
MCT-MIO	MULTI-IO FLOPPY	\$79.95
MCT-AIO	16 BIT MULTI-IO	\$59.95
MCT-MGEIO	16 BIT ALL-IN-ONE	\$129.95
MCT-AEMS	16 BIT EMS CARD	\$129.95
MCT-EEMS	16 BIT EEMS CARD	\$149.95
MCT-VGA	816 BIT VGA CARD	\$149.95
MCT-VGA-1024	1024 X 768 VGA	\$169.95
MCT-VGA-1024+	1024 X 768/256 COLORS	\$199.95

UPRIGHT CASE

\$249⁹⁵

- FOR STANDARD FULL-SIZE AND MINI MOTHERBOARDS
- 250 WATT POWER SUPPLY
- MOUNTS FOR 3 FLOPPY AND 4 HARD DRIVES
- TURBO AND RESET SWITCHES
- SPEED DISPLAY, POWER, DISK LEADS
- MOUNTING HARDWARE, FACEPLATES AND SPEAKER INCL

CASE-100 \$249.95

MORE CASES...

CASE-200	UPRIGHT HOLDS 11 DRIVES	\$499.95
CASE-120	MINI-UPRIGHT W/200 WATT PS	\$199.95
CASE-70	FULL-SIZE 286 STYLE CASE	\$89.95
CASE-50	MINI SIZE 286 STYLE CASE	\$59.95

POWER SUPPLIES

PS-135	135 WATT FOR 8088	\$59.95
PS-150	150 WATT FOR 8088	\$69.95
PS-200X	200 WATT FOR 8088	\$89.95
PS-200	200 WATT FOR 286/386/486	\$89.95
PS-250	250 WATT FOR 286/386/486	\$129.95

1024 x 768 \$599 VGA PACKAGE

- 286/386/486 COMPATIBLE CARD & 1024 X 768 INTERLACED MONITOR
- 1:1 ASPECT RATIO, 32 DOT PITCH
- 256 COLORS FROM 262,000
- 816 BIT CARD HAS 512K VIDEO RAM EXPANDABLE TO 1MB

VGA-PKG-1024+		\$599.00
VGA-PKG	640 X 480 VGA PACKAGE	\$499.95

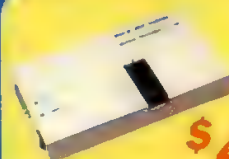
MORE MONITORS...

NEC-MULTI-3D	14" MULTISYNCH MONITOR	\$649.00
JDR-MULTI	14" MULTISYNCH MONITOR	\$429.95
CM-1440	SEIKO14" MONITOR	\$599.00
VGA-MONITOR	VGA MONITOR	\$379.95
MONO-VGA	PAPERWHITE VGA MONITOR	\$139.95

2400 BAUD MODEM \$89⁹⁵

- 2400/1200/300 BPS INTERNAL DATA MODEM • FULL HAYES AT COMPATIBILITY • INCLUDES PROCOMM SOFTWARE

MCT-24I		\$89.95
MCT-FAXM	AS ABOVE W/4800 BPS FAX SEND	\$119.95
PRO-96F	9600 BPS EXTERNAL W/FULL FAX	\$679.00



OUTSTANDING VALUE

\$499⁹⁵

UNIVERSAL IC PROGRAMMER & TESTER MODULE

Easily program your own IC's with this inexpensive module and software from our modular programming system. Programs EPROMs, EEPROMs, PALs, GALs, Bi-Polar PROMs, 8748 and 8751 series devices. Tests TTL and CMOS ICs, dynamic and static RAM. The test socket accepts .3-.6 inch wide ICs from 8 to 40 pins. Requires host adaptor.

MOD-MUP		\$499.95
MOD-MAC	HOST ADAPTOR CARD	\$29.95
MOD-MEP	EPROM PROGRAMMER	\$119.95
MOD-MMP	MICROPROCESSOR PGMMER	\$179.95
MOD-MBP	BI-POLAR PROM PGMMER	\$259.95
MOD-MIC	MEMORY & IC TESTER	\$129.95
MOD-MPL	PAL PROGRAMMER	\$249.95
MOD-MPL-SOFT	PAL DEVELOPMENT KIT	\$99.95

800-538-5000

CALL FOR OUR FREE CATALOG!

FOR PC'S, MONITORS, DISK DRIVES, KEYBOARDS, INTERFACE CARDS, MODEMS, LAPTOPS, CABLES, CONNECTORS, SOFTWARE, PROGRAMMING PRODUCTS, TEST EQUIPMENT, ICS AND MORE!

Call toll-free and request our latest 100 page full color catalog. You'll find over 5000 PC-compatible products plus many useful "Tech Tips" written by our experienced Technical Support staff.

ETHERNET CARDS

• 100% NOVELL COMPATIBLE		
• FOR THICK OR THIN ETHERNET		
• 8 BIT OR 16 BIT VERSIONS		
DFINET-300	NE 1600 COMPATIBLE	\$159.95
DFINET-400	NE 2000 COMPATIBLE	\$189.95
RG58-6	6-FOOT ASSEMBLED COAX CABLE	\$5.95
RG58-12	12-FOOT ASSEMBLED COAX CABLE	\$8.95
RG58-100	100-FOOT ASSEMBLED COAX CABLE	\$29.95
BNC-TERM-50	50 OHM DUMMY LOAD TERMINATOR	\$1.99

HARD DRIVES

ST-251-1	42.8 MB 5.25"	MFM	28MS	\$249.00
ST-157A	48.6 MB 3.5"	IDE	28MS	\$239.00
ST-277-1	65.5 MB 5.25"	RLL	28MS	\$289.00
ST-1144A	125 MB 3.5"	IDE	19MS	\$529.00
ST-1201A	180 MB 3.5"	IDE	15MS	\$799.00
1654	161 MB 5.25"	ESDI	16MS	\$899.00
1664	345 MB 5.25"	ESDI	14MS	\$1449.00
1568	676 MB 5.25"FH	ESDI	16MS	\$2195.00

ASK ABOUT OUR KIT PRICES

FLOPPY DRIVES

FDD-1.44X	1.44MB 5 FLOPPY BLACK	\$99.95
FDD-1.44A	1.44MB 3.5 FLOPPY BEIGE	\$99.95
FDD-55GFV	5.25" 720K DOUBLE Sided 1MB	\$99.95
FDD-1.2	5.25" DOUBLE Sided 1MB	\$89.95
FD-55B	5.25" 1200K DOUBLE Sided 1MB	\$89.95
FDD-360	5.25" DOUBLE Sided 360K	\$69.95

DYNAMIC RAMS

PART#	SIZE	SPEED	PINS	PRICE
416A-100	65536x1	100ns	16	1.99
TMS4464-12	65536x4	120ns	16	3.45
41256-150	262144x1	150ns	16	1.85
41256-120	262144x1	120ns	16	1.89
41256-100	262144x1	100ns	16	1.99
41256-80	262144x1	80ns	16	2.19
414256-100	262144x4	100ns	20	6.95
414256-80	262144x4	80ns	20	7.95
1MB-120	1048576x1	120ns	18	6.89
1MB-100	1048576x1	100ns	18	6.95
1MB-80	1048576x1	80ns	18	7.95
1MB-70	1048576x1	70ns	18	8.75
1MB-60	1048576x1	60ns	18	9.05

SIMM/SIP MODULES

PART#	SIZE	SPEED	FOR	PRICE
41256A9B-80	256K x 8	80ns	SIMM/PC	19.95
421000A8B-10	1MB x 8	100ns	SIMM/MAC	19.95
421000A9B-10	1MB x 9	100ns	SIMM/PC	64.95
421000A9B-80	1MB x 9	80ns	SIMM/PC	69.95
421000A9B-60	1MB x 9	60ns	SIMM/PC	89.95
256KX9SIP-80	256K x 9	80ns	SIP PC	21.95
256KX9SIP-60	256K x 9	60ns	SIP PC	25.95
1MBx9SIP-10	1MB x 9	100ns	SIP PC	64.95
1MBx9SIP-80	1MB x 9	80ns	SIP/PC	69.95

MATH CO-PROCESSORS

intel
• Manual
• Software guide
• 3 Year Warranty



PART#	SPEED	PRICE
8087	5 MHz	89.95
8087-2	8 MHz	129.95
8087-1	10 MHz	169.95
80287-XL	12 MHz	199.95
80287-XLT	12 MHz	199.95
80387-16	16 MHz	359.95
80387-20	20 MHz	399.95
80387-25	25 MHz	499.95
80387-33	33 MHz	649.00
80387-SX	16 MHz	299.95
80387-SX20	20 MHz	399.95

SALES 800-538-5000 Customer Service 800-538-5001 Local/Int'l 408-559-1200
Technical Support 800-538-5002 Fax 408-559-0250

TERMS: Minimum order \$10.00. For shipping & handling include \$5.00 for ground and \$7.50 for air. Orders over 1 lb. and foreign orders may require additional shipping charges. Contact our Sales Dept. for the amount. CA residents must include applicable sales tax. Prices subject to change without notice. We are not responsible for typographical errors. We reserve the right to limit quantities and to substitute manufacturer. All merchandise subject to prior sale. A full copy of our terms is available upon request. Items pictured may only be representative. JDR, the JDR logo, JDR Microdevices, and the MCT logo are registered trademarks of JDR MICRODEVICES, INC. Modular Circuit Technology, and trademarks of JDR MICRODEVICES, INC. Copyright 1991 JDR MICRODEVICES.

PC Magazine says "... Arlington offers worry-free mail order purchasing at reasonable rates!"

IBM PERSONAL SYSTEM II

Model 30, 286, 40 MB, w/Monitor	\$1799
Model 55SX, w/60 MB w/Monitor	\$2599
Port. 70/120	\$5695
Model 70, w/60 MB and Monitor	\$2999
Model 70, w/121 MB and Monitor	\$3799
Model 70-A21, w/121 MB and Monitor	\$4999
6 Month Warranty	

COMPAQ 286N

(12MHz) 40MB, 1MG Memory,
Mono VGA Card & Monitor .. **\$1699**

COMPAQ PORTABLES

LTE 20	\$1899
LTE 286 20/40	\$2499/\$2799
SLT 386 S/20-60 MB	\$4749

COMPAQ 386

Model 386S MOD I	\$1799
Model 386S w/40 MB (16 MHz)	\$2099
Model 386E w/40 MB (20 MHz)	\$2795
Model 386E w/100 MB	\$2999
Model 386 25E w/100 MB	\$4299
Model 386-33 w/84 MB	\$6999
6 Month Warranty	

PANASONIC COMPUTERS

FX1925 — 386SX, 40 MG, VGA color
monitor **Call**

CF170 Notebook 6.1 lbs., 10 MHz,
20 MB. **Very Competitive Prices**

CF270 Notebook, 16 MHz, 20 MG,
VGA .. **Very Competitive Prices**

GOLDSTAR

286, 12 MHz, 1 MG Memory, 40MG, VGA Monitor	\$999
386SX, 16 MHz, 1MG, 40MG, VGA Monitor	\$1249
386SX, 20 MHz, 1MG, 40MG, VGA Monitor	\$1399
386 Tower, 33 MHz, 4 MG Memory	\$2499
Laptop - 386SX, 40 MG, VGA	\$1999

MODEMS

Hayes 1200/2400 Ext	\$279/329
V-Series 9600 Int.	\$549
Intel 2400	\$139
Intel 2400 Ext.	\$159
Intel 9600	\$479
Megahertz 2400 Toshiba	\$139
2400 Cpq LTE	\$139
Everex 2400	\$89
Everex 2400 External	\$169
US Robotics 9600	\$579

CHIPS

256K/1 MG Chips . each	\$4/\$7
256K/1MB Simms	\$30/\$59
Compaq 386 1 MB	\$149
Compaq 386 4 MB	\$349
Compaq 386 2 MB-33	\$179
Compaq SLT 2 MB	\$249
Compaq LTE 2MB	\$199
Compaq Port 2MB	\$275
IBM 2-8 MG Board	\$379
IBM 30-286 512K	\$79
IBM 70 & 80 2 MB	\$159
Toshiba Port 2MB	\$175

intel

Intel 8087-3	\$89
Intel 8087-2	\$119
80287-10XL	\$179
80387-16/80387-SX	\$309/\$279
80387 SX-20	\$299
80387-20	\$349
80387-25/80387-33	\$439/\$399

MULTIFUNCTION BOARDS

AST 6 Pack w/384K	\$169
AST 6 Pack 286	\$189
AST Rampage Plus	\$339
AST Rampage Plus 2 MG	\$449
Irma Board III	\$409
AST 5251-II Plus	\$479

INTEL

Intel Above Board+	\$329
Intel Plus 8 w/2 MG	\$479
Intel 386 PC w/1 MG	\$469
Intel Satisfaxtion	\$379

SCAN. & DIGIT.

Panasonic FXRS 3070U	\$949
Summasketch 12x12	\$319
Summasketch 12x18	\$539
Sharp FO-333 Fax	\$749

DRIVES & TAPES

Ext. 5 1/4" for PSII	\$159
Ext. 1 2 for PSII	\$179
Toshiba 3 1/2" 720K	\$69
Toshiba 3 1/2" 1.44	\$79
Colorado Jumbo 40	\$259
Everex 40 MB Tape	\$239
Everex 60 MB Tape	\$599

SEAGATE HARD DISKS

20 MB for XT (ST225)	\$239
30 MB for XT (ST238)	\$259
48 MB 3 1/2" (157N-Kit)	\$299
40 MB (157A)	\$239
40 MB for AT (ST251-1)	\$249
80 MB for AT (4096)	\$549
80 MG 296 Kit	\$379
111 MB 1126A	\$629

IOMEGA

20 MB Int. w/boot card	\$999
44 MB Int. w/boot card	\$1125

PLUS

Hard Card 20 MB	\$489
Hard Card 40 MB	\$549
Hard Card 80 MB	\$579
Hard Card 105 MB	\$679

CONNOR HARD DRIVES

40 MB	\$259
100 MB/200MB	\$459/\$799

PRINTERS

EPSON

VERY COMPETITIVE PRICES!!

LX810	\$173	LQ860	\$549
FX850	\$289	LQ1010	\$369
FX1050	\$399	LQ1050	\$569
LQ200	\$239	LQ2550	\$849
LQ510	\$249	EPL 7000	\$799
LQ850	\$435	EPL7500	\$1999

ES-300C ... \$1199

OKIDATA

ML320	\$319	ML393	\$929
ML321	\$439	OLC 400	\$629
ML380	\$289	OLC 820	\$1249
ML390	\$439	OLC 840	\$1899
ML391	\$599	OLC 800	\$949

CITIZEN

120D	\$129	HSP500	\$309
GSX140	\$279	HSP550	\$429

PANASONIC GREAT PRICES!!!

1123	\$229	1654	\$519
1124	\$259	1695	\$389
1180	\$149	4420	\$779
1191	\$219	4450I	\$1199
1624	\$359	4455	\$1999
4420/4450I 2MG Memory	\$199		

HEWLETT-PACKARD

Laserjet III w/Toner	\$1559
Laserjet IIP w/Toner	\$869
Deskjet Plus 500	\$529
Laserjet IIID	\$2575
Pacific Data 1MG	\$129
Pacific Data 2MG	\$159
Pacific Data 4MG	\$299
Pacific Page	\$329
Pacific CFL	\$259
Plotter-in-Cartridge	\$229
Pacific Data 25 in 1 Font	\$249

NETWORKING

Advanced Network 2.15	\$2099
SFT Network 2.15	\$2899
ELS Level I 4 User	\$489
ELS Level II 8 User	\$1199
NE1000 Ethernet	\$179
NE2000	\$189
Ethercard +/-16	\$149/\$189

SOFTWARE

D Base III Plus	\$419
D Base IV	\$479
Harvard Graphics	\$289
IBM Displaywrite V	\$239
Logitech Mouse	\$69
Lotus 123 2.2/3.1	\$329/\$379
Microsoft Mouse	\$99
Microsoft Excel	\$299
Microsoft Windows 3.0	\$99
Microsoft Word	\$219
Multimate Version IV	\$239
R Base for DOS	\$439
Symphony	\$459
Ventura Desktop Publ.	\$519
Word Perfect 5.1	\$249

VIDEO BOARDS

ATI 16 Basic	\$89
ATI VGA Wonder	\$199
ATI VGA Wonder 512	\$229
Goldstar VGA	\$79
Genoa 6300/6400	\$189/\$239
NEC Grph Engine 256	\$899
Orchid Pro w/512K	\$289
Paradise VGA	\$139
Paradise +16	\$179
Paradise VGA 1024	\$189
STB Power IMG	\$249

MONITORS

MITSUBISHI

EGA	\$339
Diamond Scan	\$489
HL6605 16"	\$1049
HL6905 20"	\$1799
3950 ADK	\$1649

NEC

Multisync IIA	\$469
Multisync IIID	\$599
Multisync IVD	\$979
Multisync VD	\$2275

PANASONIC

1381 VGA 1024x768	\$379
1391 VGA 1024x768	\$499

GOLDSTAR

Color/EGA	\$199/\$269
VGA 1425+	\$279
VGA 1430	\$299

CIRCLE 336 ON READER SERVICE CARD

Arlington
Computer
Products, inc.

Defective software will be replaced with the same item only. We cannot guarantee compatibility. Returned shipments are subject to a restocking fee. Prices and availability subject to change without notice.

HOURS C.S.I.
8 am - 6:30 pm - Mon-Fri
9 am - 2 pm - Sat

1970 CARBOY
MT. PROSPECT, IL 60056

FOR ORDERS & SYSTEMS QUOTES

800-548-5105

CUSTOMER SERVICE AND IN ILLINOIS 708-228-6333

SHIPPING 708-228-9748

TECHNICAL ASSISTANCE 708-228-1470

FAX 708-228-0516

No surcharge for MasterCard or Visa.

Programmer's Paradise

800-445-7899

Your Source for over 5000 Software Titles!

LIST	OURS	LIST	OURS
C & C++ Development Tools			
Borland C++	495	325	199
w/ TIER 1 Class Library	895	480	99
Greenleaf CommLib	359	287	199
Greenleaf SuperFunctions	299	220	
MetaWare High C 386 1.7	895	849	
Microsoft C 6.0	495	330	
w/ MS Windows Dev. Toolkit	749	525	
Vermont Views	495	415	
Watcom C 386 Prof./Standard	CALL	CALL	
Zinc Library	200	179	
Add'l Development Tools			
BRIEF	249	CALL	
CodeBase IV	295	225	
Essential Graphics	399	330	
HALO Professional	595	385	
Instant C	795	719	
Lahey F77L EM/32	1290	1035	
Micro Focus COBOL/2	1800	1480	
ObjectVision	100	95	
Periscope Debuggers	CALL	CALL	
PharLap 386 DOS Extender	495	430	
Sage Editor	295	240	
SpontaneousAssembly	199	160	
Turbo Pascal Professional 6.0	300	299	
VEDIT PLUS	185	115	
Communications			
Blast II	250	179	
Carbon Copy Plus	199	120	
Co/Session	249	179	
Crosstalk XVI	195	115	
Connectivity			
Lantastic Starter Kit	525	382	
Novell NetWare 386 3.1	CALL	CALL	
Database			
Blinker	249	225	
Clarion Personal Dev.	79	72	
Clarion Professional Dev.	845	525	
Clear	200	130	
Clipper	795	521	
dBASE IV	795	495	
dGE	295	240	
FoxBASE+	395	249	
Paradox 3.5	795	540	
R&R Code Generator	150	129	
R&R Report Writer	249	219	
SilverComm Library	249	215	
Graphics			
Corel Draw!	595	380	
Harvard Graphics	495	280	
Lotus Freelance Plus	495	299	
PageMaker	795	519	
Pizzazz Plus	149	115	
Oper. Systems/Environments			
DR DOS 5.0	199	129	
Microsoft Windows	150	99	
VM/386	249	199	
Science/Engineering			
AutoCAD	3500	CALL	
AutoSketch 3.0	150	95	
CHIWRIter	349	315	
DERIVE	250	225	
Mathematica 386	695	625	
Systat/Sygraph Bundle	895	849	
Spreadsheets			
Lotus 1-2-3 3.1/Ami Pro	595	399	
Microsoft Excel	495	329	
Quattro Professional	495	329	
Sideways	70	45	
Utilities			
386MAX5.0	130	114	
BlueMAX	155	129	
BootCon	60	43	
Control Room	129	75	
Dr. Switch-ASE	180	153	
FASTBACK Plus	189	119	
MKS Toolkit	249	199	
Norton Commander	149	99	
Norton Utilities	179	129	
PC Tools Deluxe 6.0	149	95	
SQUISH PLUS	100	75	
Word Processing			
Grammatik IV	99	55	
Microsoft Word 5.5	450	279	
Professional Write	249	149	
WordPerfect 5.1	495	250	
WordStar Professional 6.0	495	309	
Windows Applications			
Ami Professional	495	CALL	
Charisma	495	339	
Crosstalk for Windows	195	129	
Designer	695	466	
Microsoft PowerPoint	495	339	
MS Word for Windows	495	339	
PC Paintbrush/Plus	199	117	
Superbase 4	695	449	
Wingz	499	359	
Windows Development Tools			
Actor	CALL	CALL	
Case/W	995	939	
Knowledge Pro	695	559	
Smalltalk/V Windows	495	395	
ToolBook	395	329	
WindowsMAKER	795	635	

...Thousands more products available!
Call or fax today for your FREE catalog.

HARVARD GRAPHICS

The market-leading business graphics application, developed especially for business professionals who need to create effective presentations. Its intuitive interface and ease of use allow you to produce a practically limitless array of charts and graphs instantly. The full-featured drawing capabilities mean your images can be easily customized. A complete range of output capabilities include overhead transparencies, 35mm slides and freerunning computer ScreenShows.

List Price: \$495 Ours: \$299

FAX Orders: 1-800-445-7899



SQUISH PLUS

Enlarges the capacity of all your disks—hard, floppy, or silicon. By compressing data, it can get up to 240MB on a 120MB hard disk without any new hardware. Unlike archive programs, it's completely automatic and invisible. Squished files stay compacted on disk even while they're being used, and you're free to choose which files to compress. Because it's a device driver, it's totally compatible with all your other software: any database, computer, backup, cache, etc.

List: \$100 Ours: \$75

FAX Orders: 1-800-445-7899



MICROSOFT EXCEL FOR WINDOWS

Makes even the most complex task easy! The new Toolbar lets you access powerful features right at your fingertips. Use outlining to hide details and summarize your analysis. Just click and automatically consolidate rows and show your most important line items. Then combine a worksheet, a chart, and text on a single page, turning financial information into a stunning visual report.

List: \$495 Ours: \$329

FAX Orders: 1-800-445-7899



A Division of Voyager Software Corp
1163 Shrewsbury Ave., Shrewsbury, NJ 07702

1-800-445-7899

Corporate: 800-422-6507
(CORSOFT Division)

International: 908-389-9228

Customer Service: 908-389-9229

Canada: 800-445-7899

Fax: 908-389-9227

FAX Orders: 908-389-8173

POLICIES

Phone Orders

Mon-Fri 8:30 AM-7 PM EST, Sat 9:30-2:30 EST. We accept MC, Visa, AMEX. Domestic shipments, please add \$5 per item for shipping/handling by UPS ground. For domestic COD shipments, please add \$3. Rush service available.

Mail or FAX / International / POs

Phone number required with order.

FAX Orders (908) 389-8173

Call from your FAX telephone, and follow the instructions to receive more information on the products featured above!

Corporate Accounts

Call CORSOFT, our corporate sales division. Ask about volume purchase agreements.

Returns

Subject to \$25 processing charge.

* All prices subject to change without notice.



If You're Not Buying From **Bulldog** — You're Barking Up The Wrong Tree!

BULLDOG SYSTEMS

286 12 MHZ	
1 mg Ram, 1.2 floppy	\$599
286 16 MHZ	
1 mg Ram, 1.2 floppy	749
286 20 MHZ	
1 mg Ram, 1.2 floppy	819
386 20 MHZ	
1 mg Ram, 1.2 floppy	1155
386 25 MHZ	
1 mg Ram, 1.2 floppy	1215
386-25 CACHE	
4 mg Ram, 1.2 floppy	1895
386-33 CACHE	
4 mg Ram, 1.2 floppy	2250
486-25 CACHE	
4 mg Ram, 1.2 floppy	3199

FREE shipping on all **BULLDOG** systems prepaid with a Cashiers Check, Money Order or Bank Wire!

LEADING EDGE SYSTEMS

D3/SX — 80386SX/16 MHZ,	
1 mg Ram, 1.2, 52 mg hard drive,	
VGA video controller	1349
D2/LPS — 80286/12 MHZ,	
1 mg Ram, 1.44, 40 mg hard drive,	
VGA on motherboard	869

AST SYSTEMS

AST Premium 286 Model 70	1075
AST Premium 386 Model 300C	2879

LAPTOPS

You can take these lightly!	
Leading Edge DLT/386 Plus —	
80386SX—16 MHZ, 2 mg Ram, 1.44,	
40 mg hard drive, Supertwist	
LCD creen	1995
Panasonic CF170 Notebook	1389
Panasonic CF270 Notebook	1869
Atari Portfolio Palmtop	249

Call for Pricing on Toshiba Laptops!

MACINTOSH CORNER

Adobe Illustrator	345
Aldus Pagemaker V4.0	495
Color Set	205
Filemaker Pro	205
Fontbase + V2.0	299
Mac Draft	175
Mac Draw	250
Mac Write II	122
Microsoft Excel	250
Microsoft Word	250
ORG Plus	125
Studio 32	492
Swivel 3D V1.2	320
WordPerfect V1.03	220
Datashow 480	1245
Mac Sync	425
Impulse 42	335
Impulse 84	495
Impulse 168	799
Epson ES300C Color Scanner	
w/Macintosh Interface	1599

PRINTERS

EPSON	
LX 810	\$173
FX 850/1050	289 399
LQ 510/850	259 435
LQ 1010/1050	369 569
LQ 2550	849
EPL 7000	799
LQ 860	549
Epson ES300C Color Scanner	
w/ES300C Dos Interface	1450
DICONIX	
Diconix 150+	345
SEIKO	
Smart Label	189
OKIDATA	
172	199
182 Turbo	229
320 321	319 449
380	285
390 Plus/391 Plus	449 605
393 Plus/393 Color Plus	955 1069
OKI LASER	
840/820	2039 1359
360/400	1020 655
TOSHIBA	
Express 420/440	319 449
NEC	
P3200/P3300	295 419
P9300	969
2000 XE	249
6200 6300	479 639
Silent Writer II 90	1659
PANASONIC	
1124/1180	279 149
1191	229
1624 1695	359 389
4420	779
4450/4455	1199 1999
HEWLETT PACKARD	
Laser Series III	1599
Laser III D	2425
Laser II P	899
Desk Jet 500	525
LASER ACCESSORIES	
Pacific Data 1 mb, 2mb	109/149
Pacific Data 25-N 1	259
Pacific Bar Code	315
Pacific Outlines	189
Pacific Page PE	139
Plotter in a Cartridge	229
Headlines in a Cartridge	199
Pacific Print	219
Pacific Connect 256K	249
Complete Font Library	249
Super Set Plus 425	265
CANON	
LB P4	955
LBP 8 III	1799
BJ 10E	339

MODEMS & FAX

The Great Communicators!	
Adtech Micro Systems	
Datafax MNP 9600 bps send/rev	
w/2400 bps Internal MNP5 Modem	199
Externally Yours MNP	235
Smart Connect 24i MNP	75
Teleshare Fax Switch	\$129
Everex 1200 int.	69
Everex 2400 int./ext.	85 169
Everex 2400 ext. w/mnp	199
Hayes 1200B 2400B w/Smartcom	199 289
Hayes 1200 2400	279 329
Megahertz 24 for Zenith	149
Megahertz 24 for Toshiba	127
Practical Per 2400 int	105
Practical Per Pocket Modem	139 575
US Robotics 2400 9600	79 110
Viva 24 int./ext.	79 110
Cardinal 2450 int. w/Flashlink	99
Cardinal 2400 ext.	99
Cardinal 2450 int. w/MNP	129
Cardinal 2400 ext. w/MNP	139
Cardinal 2250 F Sendfax	110
Cardinal 9650 V 32 int. w/MNP	459
Oki Fax	Call!
Toshiba 3450 3750	610/679
Toshiba 4400	487
Epson 3000	625
Everex 24/96 int./ext.	\$249/319

GRAPHIC CARDS

Boca Basic VGA	\$69
Boca Super VGA	135
DFI Mono/Color	39
Everex Micro Enhancer	59
Everex Viewpoint VGA 256/512	142/179
Genoa Super Hi Res	145
Genoa 6300/Genoa 6400	199/239
Hercules Graphics Card	179
Hercules InColor	145
Hercules VGA	119
Orchid Pro Designer/e	189
Orchid Pro Designer II w/512K	279
Paradise VGA Plus	135
Paradise VGA Plus 16	169
Paradise 1024 w/512K	229
Vega VGA	139
V Ram w/512K	349
Video 7 VGA 1024/256K 512K	169/219
ATI VGA w/256K 512K	209/259
NEC Graphics Engine 256K	899
Cardinal VGA 100/200	79/89
Cardinal VGA 300, 400	99
Cardinal VGA 500/600	125/129
Cardinal VGA 700 w/512K	139

TAPE DRIVES

Everex Excel 60F	245
Everex 60 mb int./ext. Teac	595 699
Everex 60 mb int./ext. Wangtech	679 789
Archive 40 mb int./ext.	249 409
Archives FT 60 int. or ext. w/card	589
COLORADO MEMORY SYSTEMS	Call!

NETWORK

Call for the best pricing on all your networking needs!	
Advanced Network	1859
ARC Net PC 130/130E	99/129
ARC Net Active Hub Passive Hub	289/79
ARC Net PC 500FS 500WS	305/235
Lantastic 2mb Starter Kit/Adapter	389/179
Lantastic 10mb Ethernet	
Starter Kit/Adapter	519/249
Level I/Level II	439 1059
NE1000 NE2000	155/189
SFT	2639
Western Digital Ethernet Plus	179
Gateway, 3 Com, Thomas Conrad and	
Western Digital	Call for Price!

DRIVES

Conner 40 110	249 495
Seagate 20mb w/contr ST225	239
Seagate 30mb w/contr ST238	249
Seagate 40mb for AT ST251-1	249
Seagate 80mb ST 4096	469
Ext. Drives for PS/2 360/1.2	169/199
Toshiba 3-1/2" 1.44mb int.	79
Toshiba 5-1/4" 360K int.	75
Toshiba 5-1/4" 1.2mb int.	79
Bernoulli Box II 5-1/4" 20mb int.	1009
20mb ext. w/card	1309
dual 20 mb ext. w/card	1979
44mb internal w/card	1699
Plus Hard Card 20 40	489 549
Plus Hard Card II 80	595
Plus Hard Card 50XL 105XL	389 675
Western Digital IDE 40	239
Maxtor 40 meg IDE	249

MICE & MISC

Keycat II - 101 Keyboard w/Trackball	89
Microsoft Mouse w/windows 3.0	159
Microsoft Mouse w/PC Paintbrush	109
Mousesystems Mouse	89
Logitech Scan Man/Scan Man 256	179 295
Logitech 9 Serial/Bus	69 79
Logitech Track Man Serial Bus	79 85
Summasketch 12x12/12x18	339/579
The Wave Keyboard	69
Marstek 105 w/Paintbrush and OCR	169
Marstek 800 w/Paintbrush and OCR	209
Marstek 800 for Windows	229
Epson ES 300 C Color Scanner	1450

SOFTWARE

Aldus PageMaker	\$495
Carbon Copy	110
Clarion ProDeveloper	449
Clipper 5.0	499
Corel Draw	385
Dbase IV	489
Enable O/A	415
Finesse V3.1	110
Fontbase	195
Freelance Plus	325
Framework III	455
Harvard Graphics	299
IBM DisplayWrite V	229
Lotus 2 01/2 2/3 1	299/345/399
Lotus Symphony	480
Manager's Organizer	149
Microsoft Word	219
Microsoft Word for Windows	319
Microsoft Excel	299
Multimate 4.0	249
Peachtree III Complete	489
Paradox V3.5	489
Procom Plus	64
Q & A	225
Quatro Pro	315
Rbase V3.1	485
Super Calc V	299
Ventura Desktop Publ	529
Word Perfect 5.1	249
WordStar 5.5/6.0	179/199
WordStar 2000 +	279
WordStar Legacy	249
WordStar Laptop	149
Peachtree Double Bonus	219
Microsoft Windows 3.0	109

Listed software is native and all the prices are byte.

MULTI FUNCTION BOARDS

AST 286 6 Pack w/DK/w/1mb	105/169
AST 6 Pack Plus w/384K	145
AST 5251 II Enhanced	499
AST Rampage 286	319
Everex Mini Magic w/o K	75
Intel Above Board w/512K	345
Intel Above Board PS w/512K	375
Intel Inboard 386 w/adapter	985
Intel Inboard 386 for PC w/1 mb	510
Intel Above Board II Plus	299
Intel Above Board +8 w/2mb	499
Intel Satisfaction	419
Irma Board III	415
Logical Connection 256/512K	369 445
Orchid Ramquest 16/32 w/o K	289
Orchid Ramquest 8-16 w/1 meg	425
Orchid Tiny Turbo 286	205
Orchid Tiny Turbo 386	249
Orchid Tiny Turbo AT	359
Expanz	159

MATH CO-PROCESSORS

Intel			
4087 3	79	387 25	505
4087 2	129	387 33	579
387 16	319	387 SX	319
387 20	405	287 XL/XLT	205
CYRIX			
387 16	275	387 33	476
387 20	309	387 SX16	245
387 25	390	387 SX20	259
1mb Simm 80NS			
256K Simm 80NS			19
Simm, Dram and Sipp			Call
ITT			
287 8/10	139 165	387 16 20	259 299
287 12 20	179 199	387 25	379
87SX 16 20	239 259	387 33	465

MONITORS

NEC	
Get The Picture!	
MULTISYNC	
2A. 3D	499/659
4D. 5D	989 2350
PANASONIC	
1381/1391	389 499
SAMSUNG	
Flat White ML 4571	135
14" VGA Color CVJ 4891	335
MAGNAVOX	
Amber 77/RGB80 1130	99 255
LEADING EDGE	
31 VGA Color	309
CTX	
28 Super VGA Color (*5468)	
1024 x 768	359

All prices are cash prices! Retail outlets may have slightly higher prices.

SALES HOT LINE

1.800.438.6039

Shipping Information and

International Customers: 1.404.860.7364

FAX: 1.404.860.7358



BULLDOG
COMPUTER PRODUCTS

610 Industrial Park Drive
Evans, Georgia 30809

HOURS: Monday thru Friday 8:30 a.m. to 7:30 p.m.
Saturday 9:00 a.m. to 4:00 p.m.

WE ACCEPT

Purchase Orders
w/Approved Credit

C.O.D. CREDIT CARD SERVICES CARD



Compuclassics

Your Source For Software

TO ORDER, OR INQUIRE CALL
800-733-3888
OR FAX YOUR ORDER
818-347-9977

W Indicates Windows Compatible Products

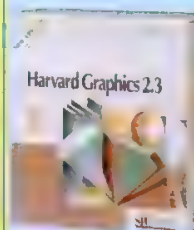
ACCOUNTING		LANGUAGE/PROGRAMMING	
DAC Easy Accounting	85	Lotus 1-2-3 Ver. 3.1	419
Pascal 2000	35	Quattro Pro 2.0	319
Peachtree Double Bonus Pack	235	Quattro Pro Upgrade	95
Quickran 4.0	39	Sideways 3.3	59
Turbo Tax 1040 Personal	39	Supercalc V	99
Turbo Tax 1040 Professional	229	IRIS 3-For-3	69
CAD		MS Excel V3.0	319
Autosketch 3.0	149	Wingz	339
Design Cad 3D 3.1	205	UTILITIES	
Design Cad 2D 4.2	155	1 Dir + 3.5	49
Generic Cadd 5.0	235	386 To The Max 5.1	72
TurboCAD	95	Above Disk 4.0	65
DrawCAD for Windows	449	Amidigm	59
COMMUNICATIONS		Automa 4.7	39
Carbon Copy Plus 5.2.2	109	Blue Max for PS/2	85
Close Up Customer 3.0	129	Central Point Backup	63
PC Anywhere IV	99	Check It	85
Procomm Plus V2.0	65	Copy II PC 6.0	27
Reflection 2+ 4.0	225	Copywrite	65
Reflection 4+ 4.0	299	Direct Access 5.0	65
Smartterm 340	199	Disk Manager	39
Smartterm 320 V1.2	135	Disk Technician Gold	95
Smartterm Exec 2.0	75	Fastback Plus 2.1	115
CrossTalk for Windows	125	Lap Link Release III	92
DA Vinci Email for Windows	849	Lotus Mogellan 2.0	109
Dynacomm Asynch for Win	189	Make Utilities 1990	92
DATABASE		Move It (286 to the Max)	55
Clairon Professional Dwell 2.1	475	Netroom (4 User)	99
Chopper 5.0	529	Netroom (10 User)	159
Database 1.1	489	Netroom Single User	49
Fastbase Plus S/U 2.1	195	Norton Antivirus	89
Fazpro S/U 1.02	455	Norton Commander 3.0	99
Paradox 3.5	525	Norton Utilities Advanced 5.0	115
Paradox 3.5 Upgrade	145	PC Link Powerpack 2.0	75
PC File 5.0	89	PC Tools Backup 6.0	87
Personal R-Base	81	Power Menu	59
Quickbase	349	Print Cache	99
R & R Real Rept Writer 4.0	155	Print Q 5.0	89
DBFast Windows	256	Q-Dos II	39
Genie SQL for Windows	999	Quem 386 5.1	52
Q & E for Windows	109	Quem	52
Superbase 4 for Windows	425	Software Bridge 5.0	79
Xerox Formbase 1.1	319	Software Carousel V5.0	55
DESKTOP PUBLISHING		Spirrite II	67
Bitstream Fonts (pack)	85	Vista 2.3	75
Freedom of Press Light	59	XTree Gold 2.0	95
Freedom of Press 2.2	249	Becktools for Windows	75
Goscript Plus	179	Desktop Set	79
PFS First Publisher 3.0	75	Distinct Backup	99
Professional Clip Art Gallery	159	Do Dat for Windows	135
Roadright	319	Fast for Windows	169
The New Print Shop	39	hDC Windows Express 3.0	52
Ventura Publisher Gold	549	hDC First Apps	52
Adobe Type Manager	59	MS Windows Productivity Pack	45
Bitstream Facilit	59	Superscript	115
Image-In Full Pack	579	WIN Connect	82
OmniPage 386 V3.0	469	Winfax	49
OmniPage Professional	655	WORD PROCESSING	
Pagemaker V4.0	499	IBM Displaywrite V 2.1	245
Soft Type	115	Facility for Wordperfect	59
Ventura Publisher for Windows	579	Glyphs for Wordperfect	79
Wordscan Plus	699	Grammatik IV	52
EDUCATION/ENTERTAINMENT		MS Word 5.5	229
Aircraft & Scenery Designer	31	Rightwriter 4.0	55
Flight Simulator 4.0	39	WordPerfect 5.1	249
Kings Quest V	45	WordPerfect 5.1 Station	189
Language Assistant French	45	AMI Professional	305
Language Assistant German	45	Grammatik IV for Windows	52
Language Assistant Italian	45	Language Master for Windows	59
Language Assistant Spanish	45	Professional Write Plus	165
PC Globe 4.0	39	MS Word 1.1 for Windows	325
Simcity	35	XENIX/UNIX	
Simearth	43	Interactive Unix Op Sys 1-2 User	329
Spellcasting 101	35	Interactive Unix System	509
Test Drive III: The Passion	37	Lotus 1-2-3 (10 User)	1039
Where In The World... Deluxe	52	SCO Fastbase + 386	715
MS Windows Ent. Pak	29	SCO Unix Develop Sys 386	715
Professor Windows	30	SCO Unix Operating Sys 386	675
FORMS/FLOWCHARTING		SCO VP/IX (Unlimited)	645
Flowcharting III	145	SCO VP/IX (2 User)	355
Formgold	59	Wordperfect for SCO Xerox S User	509
GRAPHICS		Lotus 1-2-3 Ver. 3.1	419
Don Bicklin Demo II 3.0	189	Quattro Pro 2.0	319
Deluxe Paint II Enhanced	85	Quattro Pro Upgrade	95
Drawperfect 1.1	279	Sideways 3.3	59
Freemake Plus 3.01	329	Supercalc V	99
Harvard Graphics 2.3	299	IRIS 3-For-3	69
Hipack 2.0	99	MS Excel V3.0	319
Hot Shot Graphics	179	Wingz	339
Insert Plus (w/Hilook)	135	UTILITIES	
PC Paintbrush IV	65	1 Dir + 3.5	49
PC Paintbrush IV Plus	112	386 To The Max 5.1	72
Pintazz 2.0	65	Above Disk 4.0	65
Adobe Photoshop	235	Amidigm	59
Arts & Letters Graphics Editor	450	Automa 4.7	39
Card Draw 2.0	389	Blue Max for PS/2	85
Micrographs Designer 3.01	485	Central Point Backup	63
Micrographs Chroma	345	Check It	85
MS Powerpoint for Windows	319	Copy II PC 6.0	27
Paint	175	Copywrite	65
HARDWARE & PERIPHERALS		Direct Access 5.0	65
AdLib Synthesizer Card	99	Disk Manager	39
Adobe Postscript Cartridge	299	Disk Technician Gold	95
ATI VGA Wonder + 256 M/Win	209	Fastback Plus 2.1	115
Best Data Traveller	169	Lap Link Release III	92
Best Data 9624Fax/Modem Bld	185	Lotus Mogellan 2.0	109
Copy II PC Option Board Deluxe	115	Make Utilities 1990	92
Hardcard IXL 50MB	409	Move It (286 to the Max)	55
Intel 80387-SX	305	Netroom (4 User)	99
Intel Satsatrazon Board	395	Netroom (10 User)	159
Logitech Bus Mouse	85	Netroom Single User	49
Logitech Mouseman Serial	75	Norton Antivirus	89
Logitech Serial Mouse	75	Norton Commander 3.0	99
Logitech Scan Man Plus	159	Norton Utilities Advanced 5.0	115
Logitech Scanman 256	319	PC Link Powerpack 2.0	75
Logitech Trackman Serial/Bus	89	PC Tools Backup 6.0	87
MS Mouse w/Win 3.0 Ser/Bus	159	Power Menu	59
MS Mouse w/Print Serial/Bus	105	Print Cache	99
Pacific Data 1-2-4 Plus w/OMB	115	Print Q 5.0	89
Pacific Data 1-2-4 Plus w/2MB	245	Q-Dos II	39
Pacific Page 2/MB Memory Bld	365	Quem 386 5.1	52
Pacific Page Personal Edition	365	Quem	52
Pacific 4 Memory Board w/OMB	75	Software Bridge 5.0	79
Pacific 4 Memory Board w/2MB	199	Software Carousel V5.0	55
Pacific 4 Memory Board w/4MB	335	Spirrite II	67
25-In-One Font Cartridge	269	Vista 2.3	75
Proc. Pough 2400 Ext V 42 Bis	215	XTree Gold 2.0	95
Proc. Pough 2400 Int V 42 Bis	179	Becktools for Windows	75
Quiktrial 2400 Int Modem	65	Desktop Set	79
Quiktrial 2400 Ext Modem	90	Distinct Backup	99
Quiktrial 9600Int SndFax/2400Hm	95	Do Dat for Windows	135
Quiktrial 9600Int S/FAX/2400Hm	150	Fast for Windows	169
Sound Blaster	175	hDC Windows Express 3.0	52
Super Cartridge 2 by IQ Enging	479	hDC First Apps	52
Worldport 2400	229	MS Windows Productivity Pack	45
Worldport 2400 w/MMP	339	Superscript	115
Worldport 2496	469	WIN Connect	82
Worldport 9600	635	Winfax	49
INFORMATION MANAGEMENT		WORD PROCESSING	
askSam 5.0	229	IBM Displaywrite V 2.1	245
Calendar Creator Plus 3.0	45	Facility for Wordperfect	59
Infoselect 1.1	55	Glyphs for Wordperfect	79
Instant Recall	69	Grammatik IV	52
Lotus Agenda 2.0	299	MS Word 5.5	229
Quick Schedule Plus	62	Rightwriter 4.0	55
IBM Current 1.1	235	WordPerfect 5.1	249
Packrat 3.0	255	WordPerfect 5.1 Station	189
Think	209	AMI Professional	305
INTEGRATED		Grammatik IV for Windows	52
Eight In One 2.0	39	Language Master for Windows	59
Lotus Works	95	Professional Write Plus	165
MS Works 2.0	95	MS Word 1.1 for Windows	325
PFS First Choice	75	XENIX/UNIX	
Symphony 2.2	509	Interactive Unix Op Sys 1-2 User	329
SPREADSHEET		Interactive Unix System	509
Ballar 5.1	359	Lotus 1-2-3 (10 User)	1039
Baller XE	579	SCO Fastbase + 386	715
Impress	79	SCO Unix Develop Sys 386	715
Lotus 1-2-3 Ver 2.2	339	SCO Unix Operating Sys 386	675

SPRING SPECIALS

NEW! CARBON COPY PLUS V 6.0
BUY ANY WINDOWS PRODUCT, AND RECEIVE PUBLISHER'S POWERPAK FOR WINDOWS FOR ONLY \$15
NEW! PUBLISHER'S PAINTBRUSH FOR WINDOWS
BUY LOTUS 1-2-3 v3.1 AND GET FREE! PRO (\$19.95 MANUFACTURER'S SHIPPING CHARGE) AND RECEIVE NEXT 1-2-3 UPGRADE FOR \$49 (OFFER VALID UP TO 6 MONTHS FROM PURCHASE DATE)
All promotions good while supplies last

HARVARD GRAPHICS v 2.3

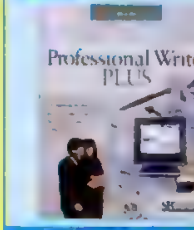
The leading business graphic software for business. Its intuitive interface and ease of use allows instant productivity for all. Full drawing capabilities allow images to be easily customized. Practically limitless charting options allow a full range of capabilities with output for printing, color slides, overhead transparencies or free running ScreenShows.



Special Value \$299.00

NEW WINDOWS PRODUCT FROM SOFTWARE PUBLISHING!

Professional Write PLUS is a Windows word processor designed to improve the productivity of business professionals and the power of their documents.



BRIEF/SOURCERER'S APPRENTICE - NEW

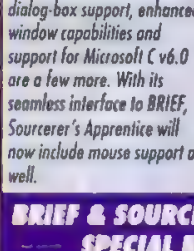
from Solution Systems... Brief 3.1 and Sourcerer's Apprentice 1.2 with Mouse Support! Mouse Support is just one of the NEW features that makes BRIEF 3.1 Faster and More Flexible Than Ever.



\$185

BRIEF & SOURCERER'S APPRENTICE SPECIAL BUNDLE \$530.

EMS Caching, Redo, dialog-box support, enhanced window capabilities and support for Microsoft C v6.0 are a few more. With its seamless interface to BRIEF, Sourcerer's Apprentice will now include mouse support as well.

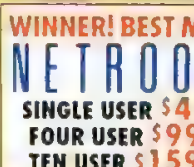


\$375

WINNER! BEST MEMORY MANAGER

NETROOM

SINGLE USER \$49.
FOUR USER \$99.
TEN USER \$159.



PLEASE CALL US FOR PRODUCTS NOT LISTED. WE WELCOME CORPORATE AND INTERNATIONAL ORDERS. WE SHIP TO APO & FPO ADDRESSES. Please Specify Disk Size When Ordering.

800-733-3888/818-347-7500/FAX 818-347-9977

Immediate shipment on purchase orders from government and state agencies, cities, counties, school and universities. • Prices subject to change without notice • We ship the latest versions • We accept Visa, MasterCard, JCB and American Express • 2% surcharge on American Express and JCB • 15% restocking fee for all non-defective items returned • Please call (818) 347-9400 for an authorization number on defective goods or your return will not be accepted. • Due to copyright laws we cannot take back any software where the seal has been broken. • Domestic Sales \$6.00 minimum shipping per item, less on bulk orders • \$10.50 Blue Label shipping • \$4.50 C.O.D. charge. • International sales call for freight pricing. • Heavier items are charged accordingly. • We do not guarantee compatibility. • Call for prices for any software item not included in this ad. • Order desk open 7 A.M. to 5 P.M. Monday to Friday (PST), Saturday 10 A.M. to 2 P.M.

P.O. Box 10598, Canoga Park, CA 91309 • Showroom: 7959 Deering Ave., Canoga Park, California 91304.

CIRCLE 205 ON READER SERVICE CARD

Panasonic PRINTERS

KX-P 1180	\$149
KX-P 1123	\$235
KX-P 1124	\$249
KX-P 1824	\$369
KX-P 4420	\$849

CALL FOR THESE
NEW KX-P MODELS!

•11241 • 1854 • 44501•

CITIZEN

200GX	\$169
GBX 140	\$289
GBX 145 Wide-24pin	\$369
Color KR-200/GBX 140	\$65

SEIKO

Smart Label-Low Price ..\$165

star

NX-1001 Multifont	\$139
NX-1020 Rainbow	\$185
NX 2420	\$279
NX 2420 Rainbow	\$299

KODAK

Diconix 150 + Pwr.\$329
Diconix Color 4\$949

BOARDS

Video 7 Vega VGA	\$129	ATI VGA Basic	\$89
Video 7 VRAM - 512K	\$339	Paradise Basic VGA	\$109
Video 7 1024i - 256K	\$169	Paradise VGA +	\$129
Video 7 1024i - 512K	\$209	Paradise 1024i - 512K	\$229
ATI VGA Wonder + 256K	\$199	Intel SatisFAXtion	\$379
ATI VGA Wonder + 512K	\$229	Freecom Fax	\$149

HEADSTART

500CD • 300CD

500 • 300

CALL TODAY

PACKARD BELL

FORGE

386SX | 386/33

40MB or 124MB

124MB CALL Unit!

Special Purchase

Altima NSX

386SX NOTEBOOK

\$2599*

*FREE DELIVERY in the contiguous 48 states

Mace Recovery	43.95
Mace Utilities 5.0	61.95
Mace Utilities 1990	89.95
Mace Vaccine	59.95
MathCAD V2.5	298.95
Math Rabbit	24.95
Microcom 811	87.95
Micrographix Charisma 2.0	319.95
Micrographix Designer 3.02	448.95
Micrographix Draw + 1	148.95
Micrographix Xport	132.95
Mitros III V2.0	83.95
Money Matters 2.0	39.95
More Fonts V2.0	73.95
Movie 'em English	51.95
MS DOS V3.3	54.95
MS DOS 4.01	59.95
MS Basic Dev Sys. 7.1	314.95
MS C Compiler 6.0	314.95
MS Cobot Comp. 3.0	574.95
MS Entertainment Pack	28.95
MS Excel 3.0	299.95
MS Flight Simulator 4.0	34.95
MS Learning PC DOS	32.95
MS Macro Assembler	97.95
MS Multitask 4.2	124.95
MS Office for Windows	624.95
MS Pascal Comp 4.0	183.95
MS Power Point 1.0	314.95
MS Project 4.0	314.95
MS Project for Windows 1.0	434.95
MS Quick Basic 4.5	61.95
MS Quick C 2.5	61.95
MS Quick C/Quick As 2.5	124.95
MS Quick Pascal	61.95
MS Windows 3.0	94.95
MS Windows Productivity Pak	41.95
MS Win Dev Tool 2.0	314.95
MS Word 5.1	209.95
MS Word for Win 1.1	309.95
MS Word Network Mode	120.95
MS Works 2.0	92.95
Multitask Debugger	113.95
Name That Disk	24.95
Netroom 640/Single User	50.95
Netroom-Unlimited User	279.95
Norton AntiVirus 1.0	83.95
Norton Backup 1.1	94.95
Norton Commander 3.0	94.95
Norton Editor V2.0	47.95
Norton Utilities 5.0	113.95
Nutshell - II	209.95
One Write Accounting System 2.06	173.95

SHIPPING

CHARGES

Order 1 or 1,000

software titles and

shipping in the

contiguous 48 states

is only-

\$4⁰⁰ PER

ORDER!

CHINON

CD ROM PACKAGES

External & Internal

Available!

Includes

Software Toolworks

CD-ROM Software

CALL FOR

CURRENT PRICES!

Optima	44.95
Pack II 2000	30.95
Pack Rat (need win) V3.0	235.95
Paradox 3.5	494.95
PC Anywhere 3	61.95
PC Anywhere 4	101.95
PC File 5.0	83.95
PC Globe 4.0	36.95
PC Paintbrush IV	106.95
PC Tools Deluxe 6.0	86.95
PC USA 2.0	26.95
PD Queue	56.95
Peachtree III Complete	142.95
Peachtree III w/PDO III	211.95
Percent Edge 1.0	63.95
Perform 2.1	154.95
Perform Pro	264.95
Personal Law Firm	34.95
Personal Lawyer	32.95
Picture Publisher Plus 2.5	379.95
PFS 1st Choice w/Prodigy 3.1	102.95
PFS 1st Publisher 3.0	91.95
PFS OfficeWriter V6.1	239.95
PFS Pro File V2.01	179.95
PFS Pro Plan V1.02	63.95
PFS Pro Writer 2.2	151.95
Pizzaz Plus 2.0	65.95
Pop Drop Plus 1.0	53.95
Power Basic	71.95
Power Menu	52.95
Presentation Task Force 3.0	125.95
Presentation Team 2.0 (Gem)	319.95
Print Cache 2.3	99.95
PrintShop (New)	36.95
PrintShop (New) Companion	30.95
Procom Plus (1.1 The Works)	63.95
Prodigy Starter Kit	26.95
Professional Writer Plus for Windows	164.95
Publish III V1.2 w/Design Ideas	133.95
Publishers Paintbrush 2.0	267.95
Q & A Networking	254.95
Q & A V.3	216.95
Q DOS III	48.95
Quem 386 3.0	61.95
Quem 50/60	61.95
Q RAM	49.95
Quattro Pro 2.0	309.95
Quicken 4.0	37.95
R. BASE for DOS 3.0	467.95
R. BASE - Personal V1.0	74.95
ReadyRight	294.95
Ready Aim - File	69.95
Remote II Host & Call	104.95
Resume Kit	25.95
Right Writer 4.0	54.95
Sideways 3.2	56.95
Smartware II	429.95
Soft Type	108.95
Spawrite II	62.95
Statgraphics 5.0 A	575.95
Superbase 2 V1.2	209.95
Superbase 4 for Windows 1.2	409.95
Superbase 4 (5 over Net Ext.)	599.95
SuperCalc 5	91.95
Switch II	55.95
Timeline 4.0	441.95
Timeslip III V4.0	188.95
Toolbook	281.95
Top Priority	55.95
Turbo Debugger 2.0	102.95
Turbo EMS	50.95
Turbo Pascal 6.0	83.95
Turbo Pascal Pro 6.0	194.95
Ultra Vision w/booster 2.0	72.95
Virus PC 1.1	73.95
Wealth Builder 1.1	134.95
Wealth Starter 1.0	34.95
WinMaker 4.0	24.95
WinFax	43.95
Wings for Win	309.95
Win Sketch for Windows	74.95
Word Perfect 5.1	239.95
Word Perfect for Win	285.95
Word Perfect Upgrade for Win	104.95
Word Perfect Connections	344.95
Word Perfect Executive	313.95
Word Perfect Rhymer	69.95
W Perfect Office PC 3.0	78.95
Xtra Gold 2.0	88.95
XY Write 3+	204.95
Your Way	114.95

MONITORS

MAGNAVOX 7CM320 \$329

28DP 800 x 600 VGA-While supplies last

Gold Star 1420 - 14" EGA	\$275
Gold Star 1425+ - VGA 640x800	\$275
Gold Star 1450+ - 31DP 800x600	\$315
Gold Star 1460 - 14" SVGA .28DP	\$345
Magnavox 7BM749 VGA Monochrome	\$129
Magnavox CM9032 .41DP VGA 640x480	\$259
Panasonic 1361 .28DP 1024x768	\$399
Packard Bell 85108V .28DP 1024 x 768	\$339
Packard Bell 8529 .31DP 840 x 480	\$299
Packard Bell 8539 .39DP VGA 640x480	\$269
Packard Bell 8551 .51DP VGA 640x480	\$229
Emerson 1415 EM VGA .41DP 640x480	\$239
Scott BM2320 - 14" multiscan .31DP	\$299
Sony 1304 .28DP 1024x768 non-inter	\$849

Seagate

3.5" Half Height Drives

ST-124 MFM	21.4MB	40MB	\$169
ST-125A IDE	21.4MB	28MB	\$205
ST-125A IDE	21.5MB	28MB	\$199
ST-136-1 MFM	32.1MB	28MB	\$219
ST-136A IDE	32.1MB	28MB	\$199
ST-136R-1 RLL	32.7MB	28MB	\$209
ST-157A-1 RLL	49.1MB	28MB	\$229
ST-157A IDE	44.7MB	28MB	\$199
ST-151 MFM	42.5MB	24MB	\$305
ST-1144A IDE	124MB	19MB	\$429
ST-1102A IDE	89MB	19MB	\$325

5.25" Half Height Drives

ST-225 MFM	21.4MB	65MB	\$179
ST-225R RLL	21.2MB	70MB	\$189
ST-236R RLL	32.7MB	65MB	\$189
ST-250R RLL	42.3MB	70MB	\$195
ST-251-1 MFM	42.8MB	28MB	\$229
ST-277R-1 RLL	65.5MB	28MB	\$249

5.25" Full Height Drives

ST-4096 MFM	80.2MB	28MB	\$519
ST-4144R RLL	122.7MB	28MB	\$569

Swift Family 3.5" Full Height Drives

ST-1111E ESDI	98MB	15MB	\$559
ST-1162A IDE	143MB	15MB	\$579
ST-1201A IDE	177MB	15MB	\$649
ST-1239A IDE	211MB	15MB	\$689

Paired Solutions-Drive + RLL Controller

Preformatted & Ready to Go!

ST-225 RP	20MB	w/RLL	\$199
ST-236 RP	30MB	w/RLL	\$225
ST-250 RP	40MB	w/RLL	\$229
ST-136 RP	30MB	w/RLL	\$249
ST-157 RP	49MB	w/RLL	\$265

One Inch Drives - NEW!

ST-325X -XT	21MB	28MB	\$195
ST-325N-6CBI	21MB	28MB	\$215
STO-351A/XT-AT/XT	42MB	28MB	\$229

QUANTUM DRIVES - 3.5" Format Only

PDLPS 62 AT	52MB	17MB	\$289
PDLPS 105AT	105MB	17MB	\$449

CONTROLLERS

ST07 IDE Controller Hard Drive Only	\$25
ST08 IDE Controller-HD & Floppy	\$35
ST11M MFM 8 Bit Controller	\$45
ST11R RLL 8 Bit Controller	\$45
ST21M MFM 16 Bit Controller	\$59
ST21R RLL 16 Bit Controller	\$49
ST22M MFM 16 Bit Control/FD Control	\$55
ST22R RLL 16 Bit Control/FD Control	\$59

HARD CARDS

30 Meg-28 ms	\$269
50 Meg-28MS	\$289

Plus Development

Hardcard II XL 50	\$369
Hardcard II XL 105	\$639

TOSHIBA

FLOPPY DRIVES

5.25" 360KB PC/XT	\$59
5.25" 1.22MB PC/AT	\$69
3.5" 720KB PC/XT	\$59
3.5" 1.44MB PC/AT	\$67

Colorado Memory

DJ10-120MB	\$239
Adaptors: AB10 Int \$99 • KE10 Ext \$119	
DJ20 - 250MB	\$305
Adaptors: FC10 Int \$84 • DJ20 Ext. CALL!	

MICE/TRACKBALLS & HAND SCANNERS

MARSTEK SCANNERS

800+ w/OCR	\$185
800+ for Windows	\$265
105+ with Paint	\$149
105+ for Windows	\$235

MICROSOFT

MS Serial/Bus Mouse + Paint	\$99
MS Serial/Bus Mouse + Win 3.0	\$145
MS Ballpoint Mouse	\$122
MICRO SPEED PC Trac Ser/Bus	\$75/85

LOGITECH

Deixa Serial with Pad	\$29
Scanman + PC	\$165
Scanman Model 256 (gray scale)	\$279
Mousetman RH Serial/Bus 400DPI	\$69/78
Mousetman Serial w/ Window 400 DPI	\$129
Trackman Serial/Bus	\$75/81

TheComplete PC

Half Page Scanner 256 gray scale	\$205
Answering Machine	\$229
Communicator	\$395
Full Page Scanner 256 gray scale	\$629
Full Page 4800 Fax Bundle	\$629
Full Page w/6000 Fax Bundle	\$679
Flatbed Scanner 256 gray scale	\$919

INTEL • INTEL

Math Coprocessors

80387-2	119	80387-20	309
80387-SX-16	289	80387-25	469
80387-SX-20	319	80387-33	579

80387-16 329 80387-33 579

85 Shipping on Intel Coprocessors

CYRIX FasMath

COPROCESSORS

80387-16 16MHz	\$279
80387-20 20MHz	\$309
80387-25 25MHz	\$369
80387-33 33MHz	\$479
80387-SX 16MHz	\$239
80387-SX 20MHz	\$269

Only \$5 Shipping On Cyrix

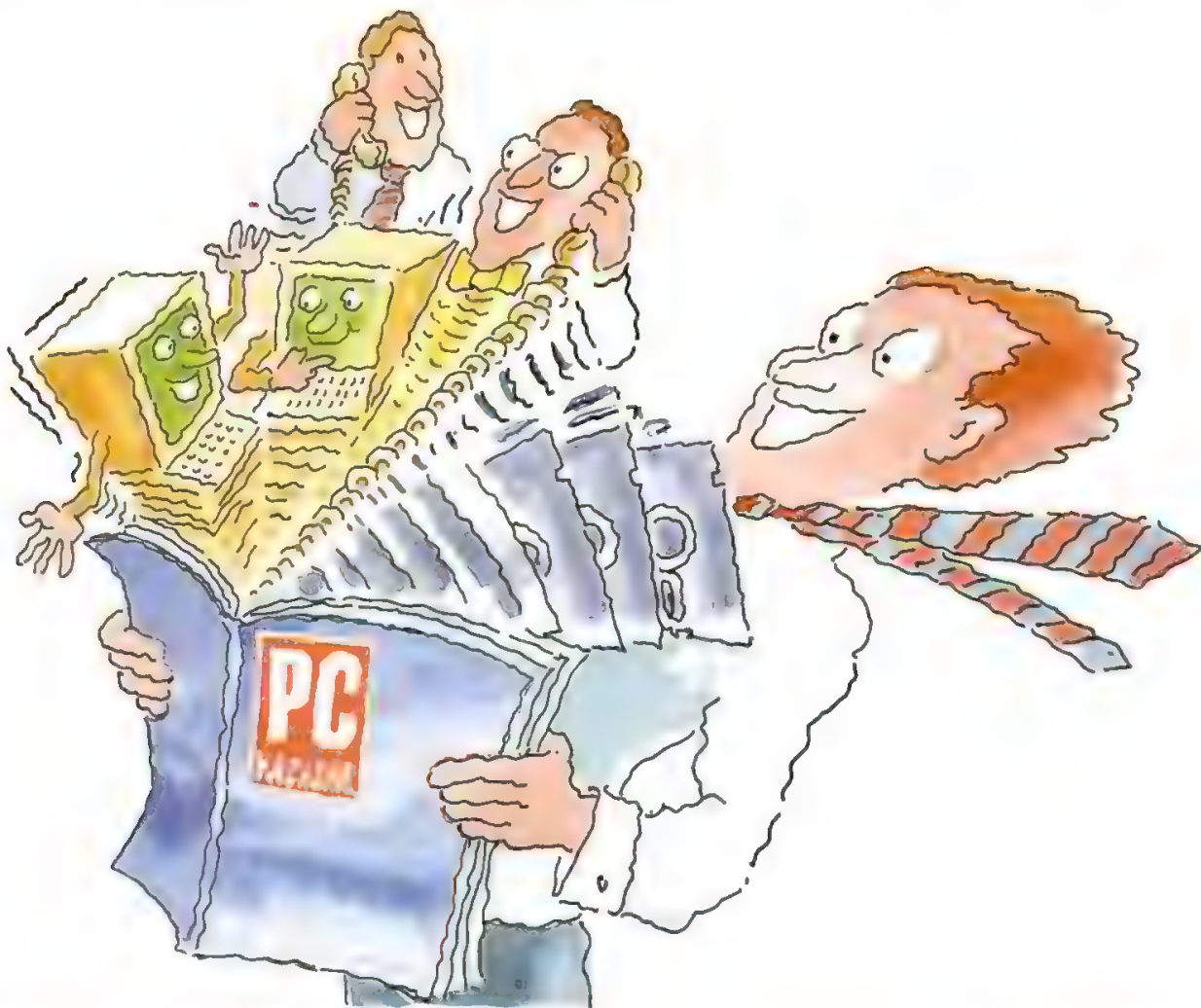
P.O. Box 17882

HOURS: CST Milwaukee, WI 53217

9am-9pm Mon-Fri (414) 357-8181

11am-5pm Sat. Fax (414) 357-7814

ORDERING INFO: Specify system for fast delivery and cash for a check or money order. Personal & company checks allow 14 business days to clear. P.O. orders: C.O.D. charges are \$4.00. In Continental U.S.A. include \$4.00 for software orders. 5% shipping for hardware. In U.S. 10% MasterCard and Visa orders please include card & expiration date and signature. WI residents please include 6% sales tax. In AR, FL, HI, MD, PA, RI, SC, TN, TX, VA, and Canada orders, please add 6% shipping. Outside the U.S. All



Make PC MAGAZINE Come Alive!

Join PC MagNet and have instant access to PC MAGAZINE's programs and product reviews.

PC MagNet is *PC MAGAZINE's* on-line information service, which is administered by CompuServe. A PC MagNet account gives you:

- Access to all of *PC MAGAZINE's* utilities and programs
- The latest PC Labs Benchmark tests
- New versions of *PC MAGAZINE's* utilities
- A way to talk directly with *PC MAGAZINE* editors and columnists
- On-line support for our programs in the forums
- Direct entry to the Computer Library family of databases
- A downloadable-index to *PC MAGAZINE's* product reviews

One call gets you started!

Sign up on-line at no additional charge.

1. To subscribe, set your communications software for either 300, 1,200 or 2,400 bps, 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest your dialing exchange, dial (800) FIND CIS (346-3247). When the modem connects, press <Enter>. At the HOST NAME prompt, enter PHONES. Follow the menus and note the number closest to you. After you have found the phone number, hang up and dial using the number you just found.
2. When you receive a CONNECT or CARRIER DETECTED message, enter **Ctrl-C**.
3. At the HOST NAME prompt, enter **CIS**.
4. At the USER ID prompt, enter **177000,5000**.
5. At the PASSWORD prompt, enter **PC*MAGNET**.
6. At the Enter agreement number prompt, enter **Z10D9000**.
7. Register your name and enter your **VISA**, **MasterCard**, or **American Express** account number. You may choose to have your company billed directly by choosing Business Account Invoicing. For more information about Business Account Invoicing, call (800) 848-8199.
8. Your personal **User ID** number and **Password** will be displayed at the end of the subscription process. Please record them in a secure place.
9. A new password will arrive in the mail within 10 days to confirm your subscription.

There are no connect charges for PC MagNet during the subscription process. PC MagNet costs \$12.80 an hour for 1,200/2,400-bps service and \$6.30 for 300-bps, via MasterCard, VISA, or American Express. For assistance regarding passwords, membership, billing or payment terms, call Customer Assistance at (800) 848-8990; outside the United States, call (614) 457-8650. There are no upfront subscription fees, or monthly charges. You pay only for the time spent on-line.

CompuServe members can join by entering GO PCMAG at any CompuServe prompt.





READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions

2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about

3. The literature will be mailed to you from the advertiser free of charge

CIRCLE FOR FREE INFORMATION

Valid after August 15, 1991

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40												
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196
197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352
353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404
405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456
457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508
509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612
613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664
665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716
717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768
769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872
873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924
925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976
977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000																												

PC 5/14-6

1. Do you work in a DP/MIS department?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one only)

01. ☐ Manufacturer of Computer Equipment, Computers, Software
02. ☐ Manufacturer—Aerospace
03. ☐ Manufacturer—Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government—Federal
11. ☐ Government—Non-Federal
12. ☐ Research and Development
13. ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture

16. ☐ Agriculture/Construction/Mining/Oil/Transportation/Utilities

17. ☐ Non-Computer Retailer/Distributor

18. ☐ Other Business or Service

99. ☐ Other

3. Please indicate your primary business function: (Check one only)

01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.
15. ☐ Other

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:

01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office? (Check all that apply.)

01. ☐ Linked to mainframe
02. ☐ Linked to mini
03. ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply.)

01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04. ☐ Macintosh

8. Do you plan to buy any PC Products?
01. ☐ Now
02. ☐ In 4 to 6 months
03. ☐ In 7 to 12 months
04. ☐ No definite plans

9. Number of Employees in your entire company:

01. ☐ 25 or less 04. ☐ 500-999
02. ☐ 26-99 05. ☐ 1000 or more
03. ☐ 100-499

Please print.

Name _____

Title _____ Phone (____) _____

Company _____

Address _____

City _____ State _____ Zip _____

Signature _____ Date _____

☐ Please send me one year (22 issues) of PC Magazine for \$29.97 Offer valid in U.S. only.



READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions

2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about

3. The literature will be mailed to you from the advertiser free of charge

CIRCLE FOR FREE INFORMATION

Valid after August 15, 1991

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40												
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174																						



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 1687
RIVERTON, NJ 08077-9687



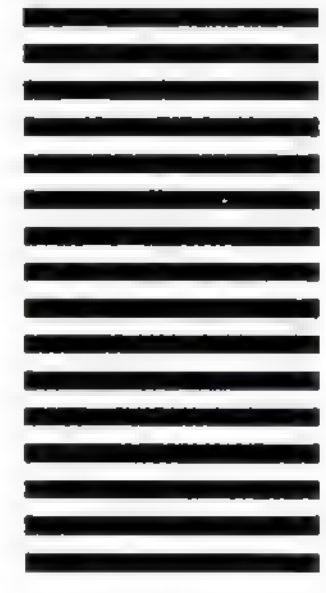
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 1687
RIVERTON, NJ 08077-9687



Paradise

ORDER TOLL FREE: U.S. & Canada - 1 800 348-4PCP (4727)

Japan - 0031-11-1865

Australia - 0014-800-126-943

In Hawaii
(808) 875-1100

FAX - 1 (808) 875-0061

Shipping & Technical Assistance - 1 (808) 875-1108

COMPUTERS

IBM PS/2	
Laptop	Call
PS/2 Mod 30-286 30 Mb	1685
PS/2 Mod 50Z 30Mb/60 Mb	1650/1790
PS/2 Mod 55SX 30/60 Mb	2415/2600
PS/2 Mod 65SX 60/120 Mb	3550/3725
PS/2 Mod 70 60/120/A21	2915/3786/4800

PS/2 Mod 90/95-486	Call
PS/2 Mod 75	Call

COMPAQ	
LTE 286 20/40 Mb	2420/2750
LTE 386 SX 30/60	4575/4924
SLT 386 60 Mb	4722
DPro 386S 20 Mod 1/40 Mb	1990/2259
DPro 386E 40/110 Mb	3485/3756
DPro 386/25E (All Models)	Call
DPro 386/33 84 Mb	7299

TEXAS INSTRUMENTS	
TI Travelmate 2000/3000	Call

AST	
Executive 286/386	2125/2582
Premium 286 512k	1047
Premium 386 16/25/33	Call
Premium 486	Call

TOSHIBA	
T1000 SE/XE/LE	956/1376/1599
T1200 XE 20/40 Mb	1970/Call
T1600 40 Mb	2490
T2000 SX 20/40 Mb	Call
T3100 SX 40/80 Mb	3744/4241
T3200 SX 40/120 Mb	3866/Call
T3200 SX Color	6395
T5100 100 Mb	3293
T5200 40/100/200/Color	4488/4865/5302/5924

DFI	
286-12 Mhz	539
386-16 Mhz	839
386 SX-20 Mhz	965
386-25 Mhz	1215
386-33 Mhz	1590
486-25 Mhz	3039

1-year on-site warranty
Call for Custom Configurations

PANASONIC	
170/270	1439/1939

MONITORS & TERMINALS

MONO/COLOR	
IBM 8503/8512	227/459
Packard Bell 1474	96
Samsung 12"	85
Samsung RGB	200

VGA/EGA MONITORS	
IBM 8506/07/08	899/629/928
IBM 8513/14/15	525/1150/719

Mitsubishi 1381/HL6915	485/1950
NEC 2A/3D	475/593
NEC 4D/5D	969/2265
Packard Bell 8531/8541	275/290
Panasonic 1381/1391	429/499
Samsung VGA/4581/4592	344/430/309
Zenith 1492	595

VIDEO BOARDS

ATI VGA Wonder 256/512+	199/240
Everex EGA	89
Hercules GB 1024/1024+2	659/959
Orchid ProDesigner II 1 Mb	339
Paradise VGA+/+16/VGA1024	122/145/175
Color/Mono w/ Parallel Card	45
VGA 1024 256/512	124/149

PRINTERS

CANON	
BJ10E	299
CITIZEN	
120D/GSX140/GSX145	135/295/399
HSP500/550	301/421
DICONIX 150	
P/S	343/347
EPSON	
LX 810	173
LQ 1010	369
FX 850	289
LQ 1050	579
FX 1050	399
LQ 2550	849
LQ 510	259
EPL 7000	Call
LQ 850	435
EPL 7500	Call
LQ 860	549
HEWLETT-PACKARD	
Laserjet 3/3D	1569/2499
Laserjet 3SI	3750
Laserjet 2P	879
Deskjet 500	489
ScanJet +	1069
PaintJet/XL	955/1680

FONTS & MEMORY	
Pacific Data 25-1	278
Pacific Data 1/2/4 Mb	129/169/265
Pacific Connect Laser Share	299
Pacific Page IIP/III	349
Pacific Data Plotter in a Cig	225
LaserJet Memory 1/2/4 Mb	119/159/245
Compaq 1/4 Mb Modules	118/383
IBM/Toshiba Memory	Call
GPI Jet Page/Superset 425+	299/259

IBM	
4019 E/4019 Laser	1089/1595
Proprinter XL24E/X24E	765/595
NEC	
P-3200	276
6200/6300	476/645
Silent Writer 290	2450
Silent Writer 2 Mod 90	1595

Quality at the best prices under the sun.

Specializing in International Orders



OKIDATA

ML 182	228
ML 320/321	324/451
ML 380	289
ML 390+/391+	449/613
ML 393+/393+color	968/1055
Okilaser 400/800	639/965
Okilaser 820/840	1276/1949

PANASONIC

1123	Call
1124/1124i	269/329
1624/1654/1695	379/619/410
1180/1191	149/239
4420/4450/4455	869/1244/2099

TERMINALS

Wyse 50/60	375/300
Wyse 30/85	310/339
Wyse 150/185	289/379

SOFTWARE

Aldus Pagemaker 4.0	499
Ashton Tute dBase III+/IV	389/479
Borland Quattro Pro 2.0	295
Carbon Copy	105
Clarion Prof. Developer	450
Harvard Graphics 2.3	289
IBM Displaywrite 5.0	249
Lotus 1-2-3 2.2/3.1	349/399
Microsoft All Titles-Lowest Price	
Microsoft Windows 3.0	90
Norton Adv. Util 5.0	110
Procomp Plus	61
Quicken 4.0	39
Ventura Publisher V 3.0	479
WordPerfect 5.1	245

400 Additional Titles in Stock

PLOTTERS AND DIGITIZERS

HEWLETT-PACKARD	
7475A/7550A	1349/2645
7570A/7575A	2699/3500
7576EXL	4599

SUMMAGRAPHICS

Summagraphics 2 12X12/12X18	335/565
-----------------------------	---------

CALCOMP

1023/25	3250/4030
12X12/12X18	275/497

MULTIFUNCTION BOARDS/CARDS/CHIPS

IBM 5250 Emulation	675
AST 5251 Emulation	489
AST 6-Pack w/384 k	145
Intel AboveBoard	265
Intel InBoard PC	492
Cyrus Fasmath	Call
80287-XL	199
80387-SX/16/20/25/33	290/320/378/462/562

MODEMS & COMMUNICATIONS

ATI 9600 ETC	484
CPI 2400 Internal	79
CPI 2400 Ext Fax	123
CPI 2400 Ext MNP	154
Everex 2400/2400 MNP	105/164
Hayes 2400/2400B	319/218
Hayes 2400 PS2/9600	321/743
Hayes Ultra 96	785
Pocket Modem	99
Intel 2400/9600	217/499
MegaHertz Laptop Modems	Call
Practical Perif. 2400/9600	132/Call
US Robotics HST/Dual	585/809

FAX MACHINES

Sharp FO 216/240/334	538/649/699
Intel Satisfaction	385
JT Fax 9600 B	339

MICE

DFI 200/400	32/42
Logitech C9/BUS/PS2	82
Logitech Mouseman	72
Logitech Scanman PC/PS2	169/240
Microsoft Mice/+ Windows 3.0	103/145

DRIVES & TAPES

Conner Peripherals	Call
ST 225/238	189/192
ST 157A/251-1	229/239
ST 1126A/1144A/1239A	449/630/795
ST 4096/4182E	530/925
Plus II XL50/105	388/638
Everex 40/60Mb Tape	250/650
Irwin 40Mb Tape	390
Toshiba External 3.5/5.25"	Lowest
Panasonic LF5010 Worm	2215
Procom Ext 5.25	199
Procom Ext PS2 Hard Drives	Call
Procom Laptop Floppy	Call

NETWORK

Call us For The Best Prices Anywhere

MISC & ACCESSORIES

Keytronics KB101+	89
Kensington Masterpiece/Plus	85/95
AB Switch Box	27
TrippLite 450/1200/2000	296/618/1175
4 outlet surge	39

Win
A Free
Hawaii Vacation!

No purchase
necessary

Most orders shipped insured next or second day air **FEDERAL EXPRESS** / 24-hour worldwide order tracking / Printer Orders received by 9 PM CST can be shipped same day / All credit card and COD orders checked electronically / We accept Amex, Visa, MC, JCB, Discover, Diners Club, COD's, Wire Transfer, Letter of Credit, **TERMS & LEASE AVAILABLE** (one day approval) / Credit cards not charged until product shipped **GOVERNMENT AND EDUCATIONAL P.O.'S ARE WELCOME** / Allow 10 days for personal checks to clear / Prices reflect a 3 per cent cash discount / Non-defective returns subject to a restocking charge / All warranties good through Paradise Computer Products / Prices subject to change without notice.

CIRCLE 145 ON READER SERVICE CARD

HOURS: 8:30 AM TO 8:30 PM CST MON-FRI, 10 AM TO 4 PM CST, SAT.

Paradise Computer Products Ltd. P.O. Box 890553 Dallas, TX 75389-0553



COMPUTER DISCOUNT WAREHOUSE™

MaxStation 286 Personal Computer

- 80286 Processor with Dual Speeds (12.5 & 8MHz)
- 1 MB RAM Standard
- One 5.25", One 3.5" Floppy
- Internal 40MB 28ms Hard Disk Drive
- 16-bit VGA Video with 256K RAM

\$899.60

MAGNAVOX



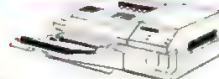
WHY PAY RETAIL?

**CDW Sells
For Less**

AND SERVICES YOU BETTER

**CDW: RATED #1 IN AN
INDEPENDENT SURVEY OF
READERS BY PC MAGAZINE**

EPSON



EPL 7000 Laser Printer

- 6 PPM • 512KB RAM Std., Exp. to 2MB • 300 x 300 DPI Res.
- 14 Resident Fonts • 2-Year Limited Warranty • HP Compatible
- Free 65 in 1 Font Cartridge... Call A CDW Rep For Price

LX810	\$169.00	LQ510	\$259.00
LQ850	429.00	LQ1050	569.00
FX850	287.00	FX1050	399.00
LQ2550	849.00	EPL 7000 Laser	799.00
LQ1010	368.00	EPL 7500 Laser PS	CALL

HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

COMPUTERS

MAGNAVOX	
MAX STATION 286 40MB VGA Interface	\$899.60
MAX STATION 286S 40MB VGA Interface	1299.46

FORCE 1 286/12 40MB 1 MB VGA Adapt.	\$679.00
FORCE 1 1 Dr. 286/12 1 MB	1574.71
FORCE 1 386SX 16 MHz 128 MB VGA 2MB	1165.77
FORCE 1 386SX 40 MB 128 MB VGA Interface	1165.77
FORCE 1 286/12 2 Drives 84 MB HD VGA Int.	1397.00
FORCE 1 386SX 16 MHz 4.5 MB Drives	1879.60

Panasonic	
CF 170 XT 10MHz 10MB 16MB Laptop	CALL
CF 270 286 16MHz 20MB VGA Notebook	CALL

IBM	
PS/2 30286 30MB \$1645.99 PS/2 655X 60MB \$3139.82	
PS/2 502 30MB 1839.21 PS/2 100 60MB 2927.79	
PS/2 555X 30MB 2124.00 PS/2 555X 60MB 2337.00	

COMPAQ	
LTE 386 Mdl 30 \$2369.00 DP386/20E Mdl 1 \$2339.46	
LTE 386 30MB Mdl 30 \$2369.00 DP386/20E Mdl 1 \$2339.46	
LTE 286 Mdl 40 1929.20 CP386/20E Mdl 1 \$2339.46	
DP386/20E Mdl 1 2029.20 SLT 386/20 Mdl 60 4080.28	

SAMSUNG	
S 3000VE 4 1/2" 10MHz	\$349.50
SD7005X 4 1/2" 10MHz 16 MHz 386 SX	\$897.21
SD 630 2 1/2" 10MHz 640K	\$228.00

TEXAS INSTRUMENTS	
TEXAS INSTR. TRAVELMATE 1000	\$1945.11
TEXAS INSTR. TRAVELMATE 3090	CALL

HP, IBM & COMPAQ MEMORY

1MB Module CPO - 386 386S 20E/25E	\$105.33
2MB Memory Board CPO LITE 286	195.00
4MB Memory Module CPO LITE 386	CALL
8MB Memory Module CPO Desargio System Pro	350.00
4MB Module CPO - 386 386S 20E/25E	385.00
4MB CPO Exp Bd - 386S, 20E/25E	CALL
1 MB AST Cupid Simms	CALL
4 MB AST Cupid Simms	CALL
AST Exer 386SX 4 MB Module	CALL
2MB Upgrade HP LaserJet II / II D	112.00
1MB Upgrade HP LaserJet II / II	112.00
2MB Upgrade HP LaserJet II / II	189.00
4MB Upgrade HP LaserJet II / II	352.00
IBM Personal System II Memory	CALL
2MB Memory Module IBM PS/2 Mod 70/50Z	160.00
1MB OKI Laser 400	159.00
2MB Upgrade Toshiba 5200	179.12
2MB Upgrade Toshiba 1200X	179.12
2MB Upgrade Toshiba 3100SX	179.12
Toshiba Laptop Memory	CALL

WYSE TERMINALS

WYSE 5090 Amber or Green	\$349.11 / 295.95
WYSE 65 30 Amber or Green	359.00 / 278.99
WYSE 185 VT320 Amber, Green or White	359.00
WYSE 150 Amber, Green or White	265.50

CD-ROM & WORM DRIVES

HITACHI 3600/3650	\$465.81 / 330.85
NEC External / Portable	\$168.95 / 329.55
NEC Portable CD w/Software Bundle	540.00
PANASONIC LF5010 WORM	2089.91
HITACHI 1700S External	467.42
TOSHIBA CD-ROM External	567.05

MATH COPROCESSORS

INTEL 80387-2 \$115.80 INTEL 80387-SX \$294.82	
INTEL 287-XLT 193.55 INTEL 387SX20 312.24	
INTEL 80287-XL 189.50	
INTEL 80387-20 359.65 INTEL 80387-33 548.20	

DOT MATRIX & LASER PRINTERS

EPSON	
LX810	\$169.00
LQ850	429.00
LQ1050	569.00
FX850	287.00
LQ2550	849.00
LQ1010	368.00

CALL FOR ACCESSORIES

CDW stocks all cut sheet feeders and ribbons.

NEC	
Silentwriter 90	\$1585.50
PC300 New Model	\$619.80
PC300 24-pin	465.70
PC300 24-pin	465.70
PC300 24-pin	465.70

DICOMINIX by KODAK	
150 Parallel 150 Serial	\$329.07 / 338.07

OKIDATA	
ML182 Turbo	\$229.48
OKLASER 400	627.08
OKLASER 800	939.86
OKLASER 820	1266.30
OKLASER 840	1895.67
ML320	314.68

Panasonic	
1124 I	\$279.69
1120	228.00
4420 Laser Printer	148.99

HEWLETT PACKARD	
H-P LaserJet Model 11D	CALL
H-P Deskjet 500H-P LaserJet II P	\$485.50 / 499.00
H-P LaserJet III	CALL
H-P LaserJet XL	1685.78

PACIFIC DATA	
PACIFIC DATA 25 in 1 Cart LAS3	\$265.91
PACIFIC DATA Page Postscript 4 HP LAS3	349.44
PACIFIC DATA Connect 169 256K	272.79
PACIFIC DATA 1 MB Upgrade for LaserJet II	169.00
PACIFIC DATA 1 MB for 2P / III	CALL
POSTSCRIPT Card W2MB HP LAS2	339.00
CPI JETMEMORY 1MB for HP HP/II/III	129.60
CPI JETPAGE for HP HP/II/III Postscript	206.72
CPI SUPERSET+ 425 Fonts for all HP Lasers	206.67

FRINTERS	
CANON BJI 0E Bubble Jet	\$323.68
CITIZEN GSX 140	295.55
CITIZEN GSX 200	CALL

BOARD PRODUCTS

AST SixPack 286/OK	\$96.50
INTEL Above Board Plus 5 1/2 MB	479.65
INTEL Above Board 512K	325.66
INTEL Inboard 386/PC	469.60
INTEL Sats/FAXton Fax Board	374.50

DRIVES, TAPES & CARDS

CONNER 42 MB / 104 MB	\$295.40 / 498.24
CONNER R4 MB 204 MB	399.20 / 639.00
IONEGA B1441 B4 Trans	918.85 / 967.73
PLUS Hardcard IXL 105MB	658.48
PLUS 1 5/8" 560MB Hard Card	547.77
PLUS Hardcard IXL 4xMB	389.80
SYSGEN 5.25" 3 1/2" External Floppy	209.25
PACIFIC RIM 5.25" External Floppy for Laptops	165.56
TOSHIBA 105MB IDE AT Hard Drive	499.50

Seagate	
ST225 20 MB	\$182.35
ST238 30 MB	198.82
ST438E 320 MB	1362.94
ST4182E 160 MB	874.44
1102A 14 MB	388.00
ST1144A 120MB IDE	459.10

MICROPOLIS	
1654 7 1/2" 16MB HH	\$794.30
1664 7 1/2" 34MB HH	1243.65
1558 3 1/2" 338 MB ESDI	1298.50

MODEMS & COMMUNICATIONS

intel	
2400 Internal	\$139.75
2400B MNP	193.72
9600 External	496.46
PS/2 Internal 2400	223.22

PRACTICAL PERIPHERALS	
2400MNP Int.	\$169.11
V.42BIS	199.50
9600 V.32.42BIS	447.67

HAYES	
2400 External	\$325.84
ULTRA 9600 Ext.	765.55
2400B Internal	\$224.45
2400 PS/2	334.40

Robotics	
Counter 2400	279.60
Dual 14 400 HST	809.85
V32 9600E	573.03
14 400 HST	569.00

MHz MEGAHERTZ CORPORATION	
2400 for TOSHIBA 139.33 2400 for COMPTON \$139.00	
CPI VIVA 2400 External Fastmod Model	112.50
CPI VIVA 2400 External Hardware MNP	148.73

COMMUNICATIONS PRODUCTS

AST	
AST 5251 11+ Enhanced Local	\$407.75
AST 5251 11+ PS/2 MCA Local	407.75
AST 5251 12 Remote	462.84
DIGIBOARD PC/8 Intelligent 8 Serial	799.60
DIGIBOARD PC/16 Intelligent 16 Serial	1172.34
DIGIBOARD PC/4 4 Serial Ports	286.10
DIGIBOARD PC/8 8 Serial Ports	424.73
DIGIBOARD PS/2 Multi Serial Boards	CALL
EVEREX 2400 Internal Modem	109.75
EVEREX 2400 External Modem	165.36
EVEREX 2400 External MNP w/ST	145.34
EVEREX 2400 MNP Internal	355.48
IRMA Workstations for Windows	412.35
IRMA II 3270 PS/2 MCA Board	409.60
IRMA II 3270 XT/AT	539.32
IRMA SNA Remote Board	247.12
WORLD PORT 2400 Modem	474.55
WORLD PORT Modem/Fax Ext	CALL
MU.TITECH MODEMS	

BATTERY BACKUP AND UPS

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84
Durant Technologies, Inc.	
BPS-300	\$192.55
BPS-550	\$356.55
BPS-800	533.30

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

AMERICAN	
AME-1200VX	\$735.95
AME-360SX	206.89
AME-450AT	261.78
AME-Smart 400 UPS	312.84

WINDOWS SOFTWARE

MICROSOFT Windows 3.0	\$93.79
ADDBE Illustrator for Windows 3.0	278.88
ALDUS Pagemaker 4.0 for Windows 3.0	496.62
ASYMETRIX Toolbook	279.00
BITSTREAM Facelit for Windows	59.50
BLTH Omnis 5 for Windows	592.33
BUMBLEBEE DB Fast for Windows	188.75
CAERE Omnipage 386	425.55
CALERA Wordscan+ for Windows	659.67
COREL SYSTEMS Corel Draw	365.58
CROSSTALK for Windows 3.0	119.85
DELIRIA Per Form Pro for Windows 3.0	268.53
DELIRIA Per Form Pro Filter for Windows	122.22
DMP PC Anywhere IV	96.85
HDC First Apps for Windows 3.0	48.31
HDC Windows Express	48.31
IBM Current for Windows	217.73
INFORMIX Wingz for Windows	307.70
MICROGRAFX Designer 3.1 for Windows	458.95
MICROGRAFX X Port for Windows 3.0	134.42
MICROGRAFX Draw for Windows 3.0	148.98
MICROGRAFX Charisma	319.23
MICROSOFT Excel for Windows V3.0	287.00
MICROSOFT PowerPoint for Windows 3.0	287.85
MICROSOFT Productivity Pack for Windows	39.20
MICROSOFT Project for Windows 3.0	419.77
MICROSOFT Windows 3.0 Developers Kit	267.20
MICROSOFT Word for Windows 3.0	267.89
PRECISION SFT Superbase 4 for Windows	419.33
PRECISION SFT Superbase 2 V1.2	208.60
REFERENCE Grammatik for Windows	49.20
SAMMA Ami for Windows 3.0	121.59
SAMMA Ami Professional for Windows 3.0	267.75
XEROX Ventura Gold for Windows 3.0	517.22
XEROX Formbase for Windows	298.33
ZSOFT Soft Type Fonts	108.88

MONO & COLOR MONITORS

CDW Color	
MAGNAVOX 12" Mono	\$9.00
SAMSUNG 12" Amber	\$4.10
SAMSUNG 14" Amber	\$9.35
SAMSUNG 14" White	104.30
SAMSUNG RGB Color	209.36

VGA & EGA PRODUCTS

VGA & EGA MONITORS	
MAGNAVOX Super VGA 28nm TC320	339.40
MAGNAVOX CM9032 42nm VGA Color	249.50
MAGNAVOX 78M749 Mono 14" VGA	119.50
MITSUBISHI 1361 Diamond Scan	490.80
NEC Multisync 40/50	971.91 / 2269.43
NEC Multisync 24" Multisync 3D	468.85 / 4009.87
PACKARD BELL 8539 VGA 39nm	274.57
PACKARD BELL 8539 31nm	297.99
PANASONIC C1381 1024x768 14"	379.28
PACKARD BELL 8510 1024x768	335.58

MEMORY!

FIRST SOURCE
INTERNATIONAL, INC.

"The Only Source for Computer Memory!"

WE ACCEPT INTERNATIONAL ORDERS AND PURCHASE ORDERS!

3 DAY INT'L DELIVERY VIA FED EX OR DHL
• USER FRIENDLY/INSTALLABLE • UNLIMITED SELECTION • TECHNICAL SUPPORT •
• QUALITY PRODUCTS • PRICES • SERVICE • WARRANTY •
CALL 714-588-9866 or FAX 714-588-9872

1-800-535-5892



LAPTOP MEMORY

TOSHIBA	COMPAQ
Model 1000SE/XE/LE	Portable LTE 286
1MB \$189.00	1MB \$129.00
2MB \$279.00	2MB \$189.00
Model 1000LE, 2000SX	4MB \$599.00
4MB \$649.00	SLT-286
8MB \$1199.00	1MB \$169.00
Model T1200XE	4MB \$199.00
1MB \$169.00	SLT-386
Model T1600	1MB \$169.00
2MB \$169.00	2MB \$279.00
Model T3100E	
2MB \$169.00	ZENITH
Model T3100SX	SuperSport 286/286e
2MB \$169.00	1MB \$179.00
4MB \$399.00	SuperSport SX, 286e
Model T3200SX	2MB \$229.00
2MB \$169.00	SuperSport SX
4MB \$399.00	2MB A/B \$229.00
Model T3200	
4MB \$279.00	NEC
Model T5100	ProSpeed 286, 386SX
2MB \$169.00	1MB \$219.00
Model T5200, T8500	4MB \$569.00
2MB \$169.00	ProSpeed 386SX/20
4MB \$999.00	1MB \$219.00
Many other laptop	ProSpeed 386
memories in stock!	2MB \$299.00
	8MB \$1249.00

NEC MEMORY

Powermate SX Plus	
1 2MB w/1 APC H850E	\$239.00
4 8MB w/4 APC 852E	\$669.00
Powermate 386/25	
2MB APC H655X	\$429.00
4MB APC H655X	\$1329.00
CALL FOR ALL OTHER NEC PRODUCTS!	

IBM MEMORY

Model PS/1	
512K 1057035	\$165.00
2MB IBM P/N/A	\$149.00
Models 30-286, Exp. Board 1497289	
512K Kit 30F5348	\$45.00
2MB Kit 30F5360	\$139.00
Models 70-E61/121,555X,65SX	
1MB 6450603	\$79.00
Models 70-E61/121,502,555X,65SX	
2MB 6450604	\$139.00
Models 555X, 65SX, 34F3077 and 34F3011	
4MB 34F2933	\$339.00
Model 70-A21	
2MB 6450606	\$149.00
Models 80-A21/A31	
4MB 6451060	\$329.00
Models 90, 95 and P75	
2MB 6450902	\$235.00
IBM Models 90, 95 and P75	
2-16MB w/2M 6450609	\$499.00
All Models 70 and 80	
2-4MB w/2M 34F3077	\$470.00

LASER PRINTER MEMORY

Hewlett-Packard LaserJet IIP, III and IIID	
2MB 334758	\$149.00
4MB 334778	\$249.00
Hewlett-Packard LaserJet II and IID	
2MB 334448	\$139.00
4MB 334458	\$239.00
Panasonic 4450I and 4420	
2MB KX P441	\$169.00
4MB P/N/A	\$269.00
IBM Laser 4019 and 4019e	
2MB 1039137	\$169.00
3.5MB 1038675	\$249.00
Canon LBP-III, IIIR and IIIR	
2MB S63 1880	\$139.00
Okilaser 400, 800 and 820	
2MB OKI P/N/A	\$169.00

BRAND NEW!

For Compaq LTE386S/20	
4MB \$1139.00	
For Canon LBP-4	
1MB \$199.00	
2MB \$349.00	
For Canon LBP-III	
2MB \$339.00	
3MB \$479.00	

AST MEMORY

Premium 386C and 386-16	
1MB Kit 500510-007	\$69.00
4MB Kit 500510-008	\$239.00
Premium 386-20	
1MB Kit 500510-003	\$89.00
4MB Kit 500510-004	\$269.00
Premium 386-SX/16/25/33 and Cupid card	
1MB 500718-002	\$69.00
Premium 486	
2MB 500718-004	\$179.00
Premium II 386SX/20 and 386SX/16	
1MB 500780-003	\$79.00
4MB 500780-004	\$339.00

HEWLETT-PACKARD MEMORY

Vectra QS/20PC, RS/25PC and 20C	
1MB Kit D1640A	\$79.00
4MB Kit D1642A	\$279.00
Vectra 486 PC and 386/25 PC	
1MB Kit D2150A	\$119.00
4MB Kit D2151A	\$419.00
8MB Kit D2152A	\$629.00
Vectra 386/25 PC	
2MB Kit D2381A	\$159.00

COMPAQ MEMORY

DeskPro 286-E,386-20/20E/25	
1MB 113131-001	\$109.00
2MB 113131-001	\$199.00
DeskPro 386S/16	
1MB 113646-001	\$119.00
4MB 112534-001	\$319.00
DeskPro 286N, 386N and 386SX/20	
1MB 118688-001	\$ 89.00
2MB 118689-001	\$149.00
4MB 118690-001	\$399.00
DeskPro 386-33, 486-33 & SystemPro	
2MB 115144-001	\$149.00
8MB 116561-001	\$959.00

CALL FOR PRICING ON ALL OTHER COMPAQ EXPANSION DEVICES!

SIMM MODULES

IBM COMPATIBLE TYPE

4M x 9-80	\$269.00
1M x 9-80	\$53.00
256x 9-80	\$16.00

CALL FOR OTHER TYPES AND SPEEDS!

TERMS AND CONDITIONS

- SEND P.O.'S AND MAIL ORDERS TO:
First Source International Inc.
36 Argonaut, Suite 140
Aliso Viejo, California 92656
Tel: 714-588-9866 Fax: 714-588-9872
- NO CASH ORDERS OR CREDIT CARD ORDERS
- Terms: AMEX, VISA, MasterCard, Discover, and P.O.'s
- All merchandise is sold "as is" without warranty, express or implied. Return Authorization # required.
- Manufacturer part numbers are for your convenience at present time only. 100% compatible or full refund.
- Prices and availability subject to change.
- We do not accept returns unless the item is not good for any reason.

WE WILL BEAT ANY ADVERTISED PRICE! - WHY CALL ANYONE ELSE?

Circle 382 on Reader Service Card (Resellers: 320)

EXCEL MICRO

1167 SIXTH ST., BLDG 9
NORCO, CALIFORNIA 91766

714-272-0500



LAPTOPS

ALR Venture 386SX 20MB	2499
ALTIMA NSX 386SX 20MB	2849
AST 286 20 40MB	2179/2479
386SX 20 40MB	2579/2879
EVEREX 386SX 20MB	2079
LEADING EDGE 386SX Plus	CALL
MITSUBISHI	
MP286L 20MB EGA	1699/2199
2400 Modem+Case+MS Works	Add 200
NEC UltraLite 286V 20MB 40MB	CALL
386SX 40 100MB	2849/3499
PANASONIC CF-170/CF-270	CALL
POCKET PC 8088 under 1lb	CALL
SHARP PC 6220-20MB 1/2MB	2449/2599
TEXAS INSTRUMENTS	
TM2000 286-20MB 1/2 3MB	2299/2449/2599
TM3000 386SX 40 60MB	3669/3969
TOSHIBA T1000SE 1MB/3MB	999/1249
T1000XE 1MB 3MB	1299/1549
T1000LE 20MB 1/3 5MB	1679/1929/2179
T1200XE 1MB 3MB	2169/2299
2800SX 20MB 1/3 5MB	3349/3599/3849
T2000SX 40MB 1/3 5MB	3649/3899/4149
T3100SX 40MB 1/3MB	3969/4099
T3200SX 40MB 1/3MB	3369/3499
T3200SX-120MB 1/3MB	3969/4099
T3200-100/200MB	5199/5699

FREE SHIPPING

PREPAID orders only by check with UPS Ground to 48 contiguous states. Some heavy items such as monitors & printers may not be free. Allow 2-3 weeks for personal & company checks. Cashier check orders shipped immediately.

REFER AD#PC 734

MEMORY UPGRADES

COMPAQ	
SLT 286 1MB 4MB	165.599
LTE 286 1MB/2MB	139.169
HEWLETT PACKARD	CALL
LEADING EDGE 386SX 1MB	129
MITSUBISHI 286 Laptop 2MB	399
NEC PS286 386SX 1 4MB	209.499
SHARP 386SX 1MB	179
TEXAS INST TM2000 1MB	199
TOSHIBA T1000 768K Card	249
T1000SE XE/LE 2MB	279
T3100SX 2MB ea 4MB ea	149.399
T3200SX 2MB ea 4MB ea	149.399
T5200 2MB ea 8MB ea	149.799

MONITORS

NEC 2A 3D	449.599
4D 5D	979/2199
PRINCETON GRAPHICS	
Ultra 12" 14" 16"	479/529/659
SEIKO 1440 1450	519.639
SONY 1304	649
VGA 9 to 15 Pin Connector	20

DISPLAY CARDS

ATI VGA Wonder Plus w/512k	235
HERCULES Graphics Stn III	629/929
NEC Graphics Eng 16/256	599.899
NUMBER 9 Graphic Kcse Lvl 1	599
G X Level 2-5 XT PS2	CALL
ORCHID ProDesigner II 1MB	325
SIGMA DESIGNS	
VGA Legend 1MB	CALL
VIDEO-7 VGA 1024/512k	CALL
V RAM VGA 512k	CALL

MATHCO

SIMMS-SIPPS	CALL
CYRIX 83087-16/20	259.289
83087 25-33	359.439
INTEL 80287 XL 80C287A	195.279
80387SX 16/20	289.309
80387DX 16/20	329.359
80387DX 25-33	479.559

POLICY: Prices & availability subject to change. Prices reflect discount for cash payment. Add 3% Mfr \$69 for COD. DISCOVER MC VISA and 5% for Amex. All sales final. Not responsible for compatibility. Returned shipments subject to 20% charge. Min \$50. CREDIT CARDS NOT CHARGED UNTIL SHIPPED.

MODEMS

EVEREX 2400 MNP5 Int/Ext	159.199
EXCEL 2400 Int/Ext	75.95
INTEL 2400 MNP5 Int/Ext	189.229
9600 V42 Ext w/SW	499
MEGAHERTZ 2400 Int w/software	
Compaq LTE/SLT	159/165
Toshiba in slot/No slot	139/135
NEC ProSpeed	149
Zenith 181, 183, SP, SP286	149
MITSUBISHI LP 2400 Int	149
PRACTICAL PERIPHERALS	
2400 Mini Pocket	129
2400 MNP5 Int/Ext	169.199
PROMETHEUS	
9600 MNP5 V32 Ext	649
2400 MNP5 Int/Ext	179.199
TELEBIT	CALL
TOSHIBA 1200 Int T1000	65
2400 In slot/No slot	219/249
US ROBOTICS	
Cougar 2400 MNP5 Int/Ext	279.315
HST 14 4 V42bis Int/Ext	499.535
9600 V32 MNP5 Int/Ext	519.569
HST V42 Dual Sid Int/Ext	759.799
WORLD PORT 2400 Portable	239
2400 MNP5 Portable	339
ZOOM 2400 Int/Ext	89.99
2400S Int w/SendFax	99

NETWORKING

DCA/IRMA Full Line	CALL
STD MICRO Arcnet Hub Act/Pass 299/79	
SYNOPTICS Full Line	CALL
ARCNET Arcnet Hub Act/Pass	CALL
Arctel Arcnet A 8 bit 16 bit 89/249	
Ethernet Arcnet E 8 bit 16 bit 189/329	
WESTERN DIGITAL Ethercard plus	
8 bit with 8k 32k	179/199
16 bit 16 bit MCA	249/279
XIRCOM Packet Adapters	CALL

ORDER BY MODEM

24HRS • 714/734-2617

BACKUP & DRIVES

ARCHIVE	
40MB XL w/tape Int/Ext	259/369
80MB XL w/tape Int/Ext	375/485
COLORADO JUMBO Backup	
120MB w/tape Int/Ext	289/379
250MB w/tape Int/Ext	349/459
MOUNTAIN 152MB w/Mach II In	649
EXTERNAL FLOPPY & Controller	
FOR PC / XT / AT - 386	
3.5" 1.44MB	189
5.25" 1.2MB	195
FLOPPY 5.25" EXT 360K / 1.2MB	
IBM PS/2 Most Models	179
COMPAQ LTE/SLT	179.185
MITSUBISHI 286L	179
NEC ProSpd 286 386SX	179
TOSHIBA Most Models	179
ZENITH SuperPort 286	179
HARD DRIVES: EXTERNAL	
Portable 20MB under 1lb	599
40 100/200MB	529/799/1599
PLUS HC II XL 50MB 105MB 365.629	
SCANNERS	
CHINNON DS 3000	545
DS 3000 w/OCR SW ReadRight	695
COMPLETE PC Full page	499
DEST Personal Scan w/OCR	679
PC 3000 Solution Pac	1499
HP ScanJet Plus Specify I/F	1399
ScanMan XT/AT/PS2	189
ScanMan Plus PS2 50 & up	249
MICROTEK 300G XT or PS2	1199
300Z Color/GS XT PS2	1699
SHARP JX 100 JX 300	CALL

PRINTERS

CANON BJ10e	329
DICONIX 150 PLUS Parallel	379
With 3 6" or 10" cable	345
HEWLETT PACKARD DeskJet 500	479
PaintJet/PaintJet XL	1069/1849
HP II/III/IIIi/IIIx	CALL
OKIDATA	CALL
TEXAS INSTRUMENTS PS17	1395



DESKTOPS

CALL FOR EXACT CONFIGURATIONS	
ALR 286 386SX	899/1069
Business VISA 386/33	1779
AST Bravo 286 386SX	1749/1549
Premium 386 25/33	3249/3989
Premium 486 25/33	5199/6299
EVEREX Tempo 386SX 16	959
Tempo 386 20/25	1299/1429
GOLDSTAR 286/12	679
386SX 16/20	919/1059

FAX, etc.

AUDIOVOX 110/220 volt 50/60 Hz	
1000/2000/3000	379/429/529
PANAFAX UF170	899
SAMSUNG 1010/1100	399/429
SHARP	CALL
COMBO Modem & Fax Card	159
COMPLETE PC Fax 9600 Int/Port	289/295
Complete Communicator Modem, Fax & Voice Mail System	
EVEREX 2496 Int/Ext	259/329
FRECOM Fax96	165
Intel SafeFax 9624	389
WORLD PORT 2496 Portable	439
Toshiba No slot/In	399/449

FOREIGN ORDERS

FAST and reliable Door to Door fully insured Most countries 3-5 days service Low shipment charges Major Credit Cards accepted Fax 714 272 0201

SPEED. GUARANTEED.



Here's a chance to buy our \$99 Math Coprocessor at no risk whatsoever! It's fully guaranteed to at least double the math performance of your software.

If you want to unlock the full power of your PC, pick up the phone and order an AMD 80C287 math coprocessor. Without it, your PC just isn't really complete. You see, our math coprocessor can *dramatically* increase the performance of 1-2-3®, dBASE®, Excel, and hundreds of your other favorite business applications! It actually runs calculations *two to ten times faster* than your PC can *without* a math coprocessor. Which means your graphs will draw incredibly fast and your spreadsheets will recalculate at truly blazing speeds. (And that's just for starters!)

High speed at a low price.

Don't think you have to pay over \$200 for a math coprocessor. Now you can get ours for just \$99 when you order direct from AMD! The AMD 80C287 is fully compatible with your 80286-based PC and the hundreds of commercially available software packages written for it. Our coprocessor is also compatible with the Intel NMOS 80287.

Installation is a snap.

The AMD 80C287 plugs easily into a socket that's already inside your 80286-based PC. In fact, you can be up and running in just five minutes. Simply plug the chip into the socket and watch the dazzling improvement in performance! The AMD 80C287 comes with easy-to-follow installation instructions, a free utilities disk (which includes diagnostics and test software), and free color computer games.

Advanced Micro Devices, Inc.

9020-11 Capital of Texas Hwy N., Suite 400
Austin, TX 78759-9797

Volume or dealer inquiries welcome. 1-2-3 is a registered trademark of Lotus Development Corporation. dBASE is a trademark of Ashton-Tate Corporation. Intel is a registered trademark of Intel Corporation.
CIRCLE 197 ON READER SERVICE CARD

Our Triple Guarantee

Guarantee #1: If the AMD 80C287 doesn't do everything we promise, or if you are unsatisfied for any reason, return the product within 30 days of purchase and AMD will happily refund your money.

Guarantee #2: If your AMD 80C287 Math Coprocessor ever fails to perform for any reason, AMD will replace it free of charge, no questions asked. Limited to two lifetime replacements per person.

Guarantee #3: AMD guarantees that the AMD 80C287 is fully compatible with your 80286-based hardware and software. If you have any compatibility problems with the AMD 80C287 during the first year, return the product and we will gladly refund the purchase price.

To Order Call Now

1-800-888-5590 ext. 2400

Outside of USA call (512) 345-1728



Yes. I want to double or triple the calculation speed of software running on my 286-based PC. Send me an AMD 80C287 Math Coprocessor, risk free, for only \$99 plus tax, shipping and handling. I understand that I can return the AMD 80C287 for a full refund within the first 30 days if I am not completely satisfied.

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

Visa/MC# _____

Type of PC _____

HARD DRIVES



QUANTUM

80 Mb Bare	\$439	19ms
80 Mb Kit	\$469	19ms
105 Mb Bare	\$499	16ms
105 Mb Kit	\$529	16ms
210 Mb Bare	\$879	16ms
210 Mb Kit	\$899	16ms

Performance Kits



CONNER

40 Mb 25ms	\$279
80 Mb 25ms	\$479
104 Mb 25ms	\$529
209 Mb 16ms	\$899

YOU GET - 16 bit Hard/Floppy controller • IDE interface, embedded PC/AT controller • Disk Manager formatting software • 3000 Initiative • 33KHz Clock Ahead • 1000 Buffer • 50Ks nonoperating shock • Dual Cables • Mounting frame • Grey and Black Bezels

Seagate IMPRIMIS

A Part of Seagate Technology

40 Mb ST157A IDE 28ms	
Bare Drive	PC/XT Kit AT/386 Kit
\$229	\$249 \$249

65 Mb ST277R-1 RLL 28ms	
Bare	PC/XT Kit AT/386 Kit
\$259	\$319 \$349

125 Mb ST1144A IDE 19ms	
Bare	AT/386 Kit
\$449	\$479

89 Mb ST1102A IDE 19ms	
Bare Drive	AT/386 Kit
\$399	\$439

210 Mb ST1239A IDE 15ms	
Bare	AT/386 Kit
\$749	\$779

340 Mb ST4376N SCSI 16ms	
Bare	AT/386 Kit
\$1475	\$1675

660 Mb ST4766E ESDI 16ms	
Bare	AT/386 Kit
\$1895	\$1995

1Gig ST41200N SCSI 16ms	
Bare	AT/386 Kit
\$2695	\$2795

MICROPOLIS Complete Kits!

Each PC PAK comes COMPLETE with EMD Controller for dual floppy dual hard drives. All kits in include cables, mounting hardware, installation software, and our comprehensive Installation Manual. Network drivers and SCSI versions are available at equivalent prices.

340 Mb	660 Mb	1Gig.	1.5 Gig.
MC1664	MC1568	MC1598	MC1528
14ms HH	16ms FH	14ms FH	14ms FH
\$1495	\$1995	\$2895	\$4095

Maxtor

Kits include: 16 bit host adaptor, bezel, rails, cables, software & HDI's Installation Manual

	Bare	Kit
80 Mb 7080A IDE (SCSI Avail.) 17ms	\$399	\$439
210 Mb MX213 IDE (SCSI Avail.) 15ms	\$799	\$829
340 Mb 8380E ESDI or SCSI 16ms	\$1295	\$1395
660 Mb 8760E ESDI or SCSI 16ms	\$1895	\$1995



HARD DRIVES ARE OUR BUSINESS!
WE CAN MEET ALL OF YOUR STORAGE NEEDS-CALL TODAY!

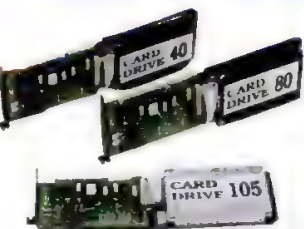


Card Drive™

NEW 16 Bit! Uses 1 slot!

Access Time*

Card Drive 40	19ms	\$299
Card Drive 80	11ms	\$429
Card Drive 105	9ms	\$499



*Effective with cache. Will work with existing hard drive. 8 bit available. Card Drives use quality Conner Maxtor or Quantum hard drives with controller and cables mounted onto a sturdy metal frame. Pre tested and pre formatted. Card Drives are available for IBM PC, XT, compatibles and most Tandy models.

TAPE BACKUP

Insight 120Mb / 300Mb with data compression	Internal Unit (with 1 tape)	\$349
---	-----------------------------	-------

CD ROM/OPTICAL

	Int.	Ext.	YOUR OPTICAL EXPERTS: EVERYTHING YOU NEED!
CHINON	\$459	\$599	
TOSHIBA	\$649	\$749	

MEMORY

Add 1Mb RAM	\$55	SIMM/SIP 1 x 9-80 \$55 1 x 8-80 \$49
		Add \$2 for SIP

U.S. and Canada
(800) 767-DISC
Order Status: (800) 729-4490 FAX: (602) 350-1145
Corporate • Gov't • Institutional
PURCHASE ORDERS Sales: (800) 733-0882 FAX: (602) 350-1180

U.S. and Canada
(800) 767-DISC
Order Status: (800) 729-4490 FAX: (602) 829-9193
Corporate • Gov't • Institutional
PURCHASE ORDERS Sales: (800) 733-0882 FAX: (602) 350-1180

HARD DRIVES International
1912 W. 4th St. Dept. JA Tempe, AZ 85281 (602) 350-1128
Visit our retail outlet in AZ!

TURN THE PAGE AND MEET THE NEXT APPLE, DELL MICROSOFT...

You'll meet some of today's most exciting new companies and their products. Showcased in color. Poised to become tomorrow's household words in the PC industry.

Turn the page and discover PREMIER—in our exciting new and expanded Marketplace section.

 **PREMIER**

Advertisers: You can target over 763,398 PC buyers in this high-impact, low-cost section by calling 1-800-825-4237.

PC
PREMIER

The Color
for Leading
Products

P

PREMIER

The four-color showcase that spotlights leading-edge PC products and services.

472-482

C

CLASSIFIED

Flexible-format display advertising: computer systems, components, software and more.

483-496

B

BUSINESSCARD

A forum for innovative, hard-to-find and low cost PC hardware, software and services.

497-499

PRODUCT CATEGORIES

	P	C	B		P	C	B		P	C	B		P	C	B
HARDWARE				SOFTWARE								MISCELLANEOUS			
Add-On-Boards	472	483		Accounting	476	489	497	Health		491		Accessories	481	493	
Backup Power				Backup Systems			497	Inventory			498	Bar Coding	482	493	499
Cables				Business	476		497	Legal				Books/Catalogues/Publications		495	499
CD-ROM			497	Business Project Management				Mailing Programs	491	498		Business Opportunities			
Communications	472			Business Time Management	476		497	Manufacturing		491		Consultants			
Computer Systems	473	483		CAD/CAM	476			Medical			498	Data Conversion		495	499
Connectivity				Communications	477	489		Multisusers				Data Recovery Services		495	
Disk Drives	473			Computer Languages				Music	479	491	498	Disk Conversion		495	
Diskettes		486		Construction				One-Of-A-Kind				Diskette Copy Services		495	
Expansion Units	474	486	497	Data Base			497	Preventive Maintenance		492	498	Insurance		496	
Input Devices				Data Entry	477	489		Programmers Tools	479	492	498	Mailing Lists			
Monitors				Data Management				Public Domain/Shareware	479	492		Networking			
Peripherals	474			Data Transfer				Real Estate		492	498	Services	482		
Plotters				Desktop Publishing	477	490		Religion	479	492	498	Supplies		496	499
Power Supplies	475			Diagnostic	478			Sales Marketing				Trade Shows			
Printers		487		Dictionary				Scientific		492	499	Training/Tutorials			
Rentals			497	Education		490	497	Security		492					
Security				Engineering		490	497	Statistics	480		499				
Speed Devices				Entertainment/Games	478	490	497	Surveys		493					
Tape Drive Subsystems	475	489		Financial	478	491	497	Taxes							
				Flow Chart			498	Terminal Emulation							
				Foreign Languages		491		Utilities	480		499				
				General				Windows		493	499				
				Graphics	478	491	498	Word Processing	481						

Let's Talk MEMORY!

- MEMORY MODULES
- MEMORY UPGRADES
- EXPANSION BOARDS



Enhance is an extensive line of high quality memory enhancement products. It is 100% compatible with the world's leading manufacturers of PC's, Laptops, Portables, Workstations, Servers and Laser Printers. The Enhance product line comes with a guarantee of immediate delivery, technical support, and quality products with a 5 year warranty.

Call us for Math Coprocessors

Call or Write for your **FREE MEMORY KIT**

TOLL FREE U.S. 1-800-343-0100
and Canada

TOLL FREE CA 1-800-662-1004



Distributed by **Sys-Com**
18720 Oxnard Street, #102
Tarzana, CA 91356
(818)343-3066
Fax: 818/343-1436
CIRCLE 901 ON READER SERVICE CARD



Voice Messaging • Call Processing
AudioTex • Telemarketing

Order Processing • Call Distribution

Powerline transforms your computer (PC/XT/AT/386) into a multi-line voice processing command center. Intelligently process your sales inquiries and messages in the background. Give your computer some punch! Hardware, software, cables, speaker, 2 year warranty.

Single Line (Bigmouth) **\$295**

Multi-line **\$895**

(Developer/OEM packages available)
VISA - MC - AMEX - COD

For Information
Or Sales Call:

(415) 522-3800

FAX (415) 522-5556

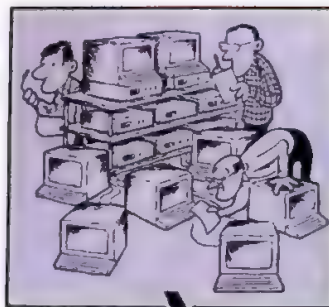
TALKING TECHNOLOGY, INC.
1125 ATLANTIC AVE. • ALAMEDA, CA 94501



CIRCLE 902 ON READER SERVICE CARD

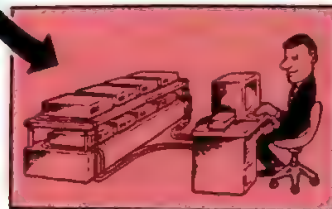
CONTROL UP TO 96 PC FILE SERVERS WITH 1 KEYBOARD AND MONITOR USING...

COMMANDER by cybex



- No external power
- "One Touch" selection
- Mix PC, PC/XT, PC/AT and PS/2
- AutoBoot™ Feature boots attached computers without operator intervention after power failure
- Shows PC power status
- Mouse support available
- TTL (MDA, CGA, EGA) up to 600 feet away

- VGA up to 400 feet
- Each unit accommodates from 2 to 8 PCs
- Up to 12 units can be cascaded
- Mounting kit available for 19" rack installation



Dealer Program Available

Cybex Corporation

2800 H Bob Wallace Ave • Huntsville, AL 35805
(205) 534-0011 • FAX (205) 534-0010
CIRCLE 904 ON READER SERVICE CARD

NETWORKING

SOLID

1-800-422-2966

- Complete Solution includes all hardware, software, connectors, and wires.
- Overhead supports expanded memory.
- All functionality file sharing, print sharing.
- No cache, 1 mbit, security, easy installation, remote services, full diagnostics and host EMM.
- Complete Line hardware available in 1 & 8 Mbps
- 10 Mbps tested per unit 10 & 8 Mbps Ethernet
- Great Price starting at \$215/computer.
- Upgradable Network drivers available
- All support unlimited phone support & 30 day money back guarantee.



100% Satisfaction, 30 Day Money Back, 30 Day 100% Satisfaction

CIRCLE 905 ON READER SERVICE CARD

NETWORK FACTORY

Best Distributor Pricing Worldwide
Free Consultation for your LAN needs!
A FEW OF OUR LINES ARE

- DCA 10NET
- DCA 10MALAN
- DCA 10BASET
- C/NET
- NETWARE
- GATEWAY COMM.
- LANTASTIC
- D-LINK
- 3270 EMULATION
- 5250 EMULATION
- ETHERNET ARCNET
- WESTERN DIGITAL
- RYBS MICARDS
- RIGHT HAND MAN
- TIARA
- BLUE LYNX

FOR FREE CATALOG: 1411 N. BATAVIA, SUITE #100, ORANGE, CA 92667, U.S.A.

FAST • RELIABLE • FREE TECH SUPPORT

OUTSIDE SO. CA 1-800-548-1812

714-744-7162 • FAX 714-744-2727

EDMUNDSON, SHAW, AND SONS, INC. (P) 1991



ariel design inc

computer solutions
45 Pond St., Norwell, MA



MOTHERBOARDS and SYSTEMS AMI 386/486 CACHE

AMI 386sx-16"
AMI 386sx-20 32k Cache
AMI MKIII 386-25 64k Cache
AMI MKIII 386-33 64k Cache
AMI Voyager 486-25 128k Cache ISA Bus
AMI Enterprise 486-3364k Cache EISA Bus

Motherboards from the industry leader. We can sell you a motherboard or a complete system. Call for the best price.

1-800-55ariel

available in limited quantities

CIRCLE 907 ON READER SERVICE CARD

GREEN WITH ENVY

Your competitors
will be when they
see your ad
showcased here
in color before 786,000+
eager PC buyers.

Call 1-800-825-4237

RECENT AWARDS

PC MAGAZINE

BLACKSHIP

486/386

ADVANCED

SVGA SYSTEMS

ONSITE SERVICE

GE Computer Service

Affordable PC Power!

Standard Features

- 30-Day Guarantee
- Unlimited Toll-Free Technical Support
- 1 Year GE On-Site Service
- Custom Configurations
- We Accept Visa, M/C, AEX, and Discover Cards

BLACKSHIP

COMPUTER SYSTEMS, INC.

Call Blackship for all your System and Networking needs.
We have a complete line-up of 286, 386, 386SX, 486, and Laptops.

4031 Clipper Court • Fremont, CA 94538
Tel: 415-770-9300, Fax: 415-770-8674

Toll-Free Orders
1-800-877-6249

CIRCLE 908 ON READER SERVICE CARD

VGA 386/486 Portable

1.44MB OR 1.2 MB FLOPPY DRIVE
2MB RAM
40 MB HARD DISK
SERIAL/PARALLEL/GAME PORTS

\$1599

- Screen to windows 3.0 supported
- SYSTEM CAN BE EXPANDABLE TO:
- 8MB RAM
- 2 FLOPPY DRIVES AND
- 1 HARD DISK (UP TO 200MB)

Please check our desktop systems & TVM monitors

COMPUTOP INC.

14634 Firestone Blvd. La Mirada, Ca. 90638
Tel# (714) 994-0605 Fax# (714) 994-0658
CIRCLE 909 ON READER SERVICE CARD

DISC DRIVES • DISC DRIVES • DISC DRIVES

jb TECHNOLOGIES, INC.

Dealers, Self-Maintainers, TPM Companies: **LOOK!**

THE WIDEST RANGE • DISC DRIVE SUPPORT IN THE MARKET

SALES

LOWEST PRICES... COMPARE!

EXCHANGE PROGRAM TOO!

DATA RECOVERY

FROM PC/MS-DOS ENVIRONMENT

REPAIR

COST EFFECTIVE... MOST 5 1/4" & 3 1/2" DRIVES

20 MB **\$129**

Miniscribe NEVER USED Complete HD Kit (SCSI) \$159 incl. Ctrlr. & Cable

HUNDREDS OF OTHER MODELS IN STOCK

✓ **Save 10%** on total price

(805) 529-0908

FAX: (805) 529-7712

5105 Maureen Lane • Moorpark, CA 93021

CIRCLE 910 ON READER SERVICE CARD

PC

MAGAZINE

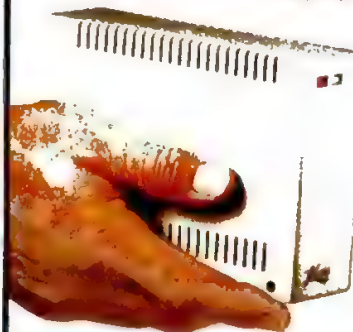
PREVIEW

The Color Showcase
for Leading-Edge PC
Products and Services

Multimedia Portable Hard Drives

- Power supply inside drive case.
- Lightweight, under 3lbs.
- Durable 60 G shock rating.
- Compact, measures only 2" x 5" x 7".
- Fast, 10ms access.

• Works with: Laptops, Toshiba, Compaq, Dell, IBM, Everything!



• No card needed, just plug into printer/parallel port.

• Three connectors on back of drive, one to computer printer port, one to printer, and one to daisy chain any other SCSI device.

425 MB

- Two sizes:
52 Megabyte \$899.00
105 Megabyte \$1,199.00
Carrying case \$29.00

- 40, 80, 105, 170, 210, 250 and 425 Megabyte drives available with SCSI Card. Prices available upon request.

Liberty
Systems

The Multimedia Portable
122 Saratoga Ave., Ste. 16
Santa Clara, CA 95051

Call us today for
your free 30-day trial.

(408) 983-1127

CIRCLE 911 ON READER SERVICE CARD

BACKPACK. IT'S A DRIVE OF A DIFFERENT COLOR.



Add a disk drive without horsing around inside your computer—just plug Backpack into your parallel port! Connect your printer to the Backpack drive. No tools. No hassles. No interface cards. Backpack works with IBM and compatibles including PCs, XT's, AT's, PS/2's, PS/1's, and

laptops. It's available in 5.25" and 3.5" and comes complete with everything you need. So see your dealer or get it straight from the horse's mouth and call us about Backpack today!



MicroSolutions

Computer Products

132 W. Lincoln Hwy., DeKalb, IL 60115
815-756-3411 Fax: 756-2928
COMDEX BOOTH #2352

CIRCLE 913 ON READER SERVICE CARD

FAST PS/2 & AT DISKS

Failsafe Novell Subsystem

The power user's first choice, Perisot's subsystems offer failsafe peak performance without stretching your budget. We support DOS, OS/2, Xenix, Unix, Netware 286 & 386 for both AT & PS 2s. No compatibility issues. No problems. It's that simple.

5
Year
Warranty
We Back Our 5.25" Drives for 5 Years!

Drive in the
Fast Lane!

20 MB Transfer Rate
15 MS Access Time
16 MB Cache

Plug & Play
Solution from
Perisot

1 GB Erasable Opticals
& 500 MB Tape Drives

System	Capacity	Access	Interface	Price
AT	1.20 MB	16 ms	IDE	\$549
AT	21.5 MB	15 ms	IDE	\$971
AT	21.5 MB	15 ms	SCSI	\$961
AT	5.25 MB	10 ms	ESDI/SCSI	\$1443
AT	670 MB	16 ms	ESDI/SCSI	\$2065
AT	700 MB	15 ms	ESDI	\$2646
AT	1.2 GB	15 ms	SCSI	\$3361
PS-2	110 MB	16 ms	SCSI	\$933
PS-2	5.25 MB	16 ms	ESDI	\$1736
PS-2	5.25 MB	15 ms	SCSI	\$2174
PS-2/386	15.5 MB	19 ms	SCSI	\$637

- ✓ Caching Controllers
 - ✓ Disk Mirroring & Duplexing
 - ✓ Torture-Tested Drives with 24-hour Burn-in
 - ✓ Lifetime Toll-Free Support
- Drive, Controller, Cables, Software
Included with Subsystems.

Call for Perisot's Complete Product Catalog

800-447-8226

International Tel: 408-988-2232

Fax: 408-988-1431



CIRCLE 912 ON READER SERVICE CARD

COMPUTERS & PERIPHERALS

COMPUTER SYSTEMS

AST, ALR, EVEREX Systems all models \$call
Phoenix 386SX Computer W/2mb memory, Color VGA, 40mb Hard drive \$1599

LAPTOPS: AST, ALR, EVEREX, TOSHIBA \$call

EXPANSION BOARDS

AST Sxpackplus (84-384k) \$120
Sxpack 286 W/512k \$130
Rampage2 256k (0-2mb) for XT \$249
Rampage 286 plus (0-8mb) \$340
Rampage2 Plus MC for PS2 50/60 (0-8mb) \$350
INTEL Above 286 Plus for XT/AT (512-2mb) \$339
Above 286Plus 8 (2-8MB) \$530
Above Board 2 Plus for PS2 50/60 (0-8mb) \$269
Above MC 32 for PS2 70/80 (0-8mb) \$359
Inboard 386 for PCAT \$Call

GRAPHICS CARDS

ATI, Paradise, Hercules, Video Seven \$call

HARD DRIVES

SEAGATE ST225 XT k4 \$239 ST251-I \$239
Maxtor, Conner, Plus Hard Cards \$call

MEMORY

64k, 256k, 1MB, SIMMS, PS2, Compaq \$call

FLOPPY DRIVES

Teahibe for PC, AT: \$79; 1.2MB \$89, 3.5", \$79/99

TAPE BACKUPS: Archive/Everex/Maynard from \$349

MONITORS: NEC, Goldstar, Mitsubishi \$call

PRINTERS: Panasonic, Canon, NEC \$call

VLM Computer Electronics

1100 E. Main St., Suite 100, Tempe, AZ 85281
(602) 966-1111
Fax: (602) 966-1111

CIRCLE 914 ON READER SERVICE CARD

Total PC Automation at Your Convenience!

The Pendulum PowerPak

- Instructs your PC to power ON/OFF at pre-selected times—locally or remotely
- Runs applications using Auto-Might™, the Event Scheduler—totally unattended!
- Reboots your PC automatically



Call 1-800-772-6483

The Pendulum Group, Inc.

333 W Hampden Ave. #1015 • Englewood, CO 80110 • (303) 781-0575 • FAX: (303) 781-2440

CIRCLE 915 ON READER SERVICE CARD

The Color Showcase
for Leading-Edge PC
Products and Services

POWER UP! with the INSIGHT UPS!

Protect Your Equipment Prevent Power Failures!

New In-Line™ Technology gives you:
True Sine-Wave Power for less!
Super Light weight! Just 28lbs!

Low, Low price!
Almost twice the power
of comparably priced units!
Runs a loaded
386/25MHz system
and VGA Monitor
up to 30 minutes!

Just
\$549

Get Insight Protection. Call **800-729-0770**

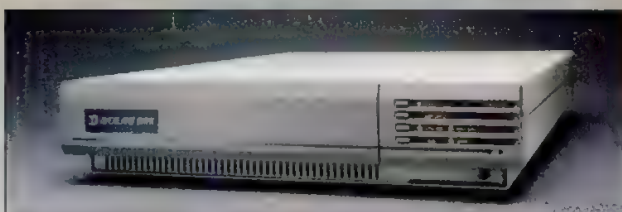


1912 West Fourth St
Dept. LA Tempe, AZ 85281
Sales (602) (50) 1128
Fax (602) 829 4193

LA0591



CIRCLE 916 ON READER SERVICE CARD



3 REASONS TO BUY THE NEW OD3210 9-TRACK TAPE DRIVE:

1. It's the first 9-track drive designed for the modern office.
2. It's got great measurements: 3 1/2" x 16 1/2" x 23".
3. You can take it with you. It weighs only 30 pounds.
4. It's so quiet, you'll forget it's on.
5. It's completely autoloading. No manual threading required.
6. It uses only 45 watts (other drives average 200).
7. It's reliable. Very. No other drive has fewer moving parts.
8. It's surprisingly affordable.
9. It comes with a 2 year warranty, toll-free support, and the ODI Special Service Program.
10. It's designed and built by Overland Data.

True, we promised you 3 reasons. But we felt compelled to make up for the lack of reasons to buy any other drive. To find out more, call our toll-free number.

1-800-PC9-TRAK
(1-800-729-8725)

CIRCLE 918 ON READER SERVICE CARD



OVERLAND DATA
San Diego CA

U.S. Phone: 1-619-571-5555 • FAX: 1-619-571-0982

EVERYTHING'S COMING UP ROSES.

Everything's gonna be
roses because 84.2% of all
PC buyers sampled
in a syndicated study
closely examine every ad
in PC Magazine.

Call 1-800-825-4737



*"The clear winner among half-inch
nine-track tape back-up devices"*

NineTrack Tape Sub-Systems

PC Magazine

New high-performance, easy-to-install software make the Chi NineTrack even faster and easy to use. NineTrack gives you the power to read and write to 9-track tape with your IBM® PC/XT/AT/386, 486, PS/2® and compatibles Exchange data with other PCs, minis and mainframes. 1600/3200/6250 BPI systems are available.

New software features

- Data transfer rate of 1MB per second for PC bus
- Full menu support or execute commands from DOS prompt or batch files
- Expert Support System
- Hard disk back-up utilities

Call us today. 800-828-0590 216-349-8600



*Reg. U.S. Pat. Off.

Computer Logics
31200 Carter Street
Cleveland, OH 44139
Fax: 216-349-8620

CIRCLE 919 ON READER SERVICE CARD

9 TRACK TAPE DRIVES 3480 TAPE DRIVES FOR PC/XT/AT/386/386/PS2

LOWEST
PRICES
BEST
QUALITY



LAGUNA CONVERSION SYSTEMS

26941 Cabot Road
Suite 131
Laguna Hills, CA 92653-7017

(800) 266-4 LAMP
(714) 367-0497 FAX
(714) 367-0508 FAX

CIRCLE 920 ON READER SERVICE CARD

PC
MAGAZINE

PERFORMANCE

The Color Showcase
for Leading-Edge PC
Products and Services



ACCOUNTING SOFTWARE

\$45 COMPLETE!

PACIOLI 2000™ FOR IBM & COMPATIBLES

Contains Full-featured Accounting with 8 Modules Fully Integrated into One System: Billing, Accounts Receivable, Inventory, Purchasing, Accounts Payable, General Ledger, Budgeting, Auditing.

FREE Unlimited Customer Support • **FREE** 2 Hour Training Videotape Use as Single-User or Multi-User System — Network Ready with No Additional Fees.
Easy to Install • Easy to Learn • Easy to Use • Context-sensitive Help Report Writer, Multi-Company, Database Export, Mouse Support, Pull-down Menus

"The equal of other high end accounting programs in every way, but cost!" — New York Times, July 1, 1990

VISA/MC Orders Only **800-243-1515 Ext. 800EF**
24 HOURS-A-DAY — 7 DAYS-A-WEEK

Questions: 214-931-2033 • Or Check/MO — Add \$6 shipping
S. Software • 2880 Bergey Road, Dept. 800EF, Hatfield, PA 19440



CIRCLE 91 ON READER SERVICE CARD

PAYROLL MANAGER® KNOWS PAYROLL!

PAYROLL MANAGER

turns Quicken 4 into a complete payroll system.

- **PAYROLL MANAGER** — Fully automates your payroll tasks using the world's most powerful time and expense program.
- **PAYROLL MANAGER** — Integrates with Quicken 4, including deductions, state and federal taxes, and more. No other payroll program can do this.
- **PAYROLL MANAGER** — Integrates with Quicken 4, including deductions, state and federal taxes, and more. No other payroll program can do this.
- **PAYROLL MANAGER** — Integrates with Quicken 4, including deductions, state and federal taxes, and more. No other payroll program can do this.

1-800-443-5806

In Fla. 813-530-7400 30-day, money-back guarantee.
PAYROLL MANAGER ONLY **\$95** PAYROLL MANAGER & QUICKEN 4 **\$135**

Ghost Software

1000 E. Broadway Rd., Suite 103 D
Columbus, OH 43213

CIRCLE 92 ON READER SERVICE CARD

LEARN ABOUT POINT OF SALE!!!

thru Video

**GIVE YOUR BUSINESS THE COMPETITIVE
ADVANTAGE IT NEEDS TO SUCCEED!!!**

"A COMPUTERIZED POINT OF SALE SYSTEM"

Our video tape fully illustrates Point of Sale products. Hardware and Software, how it operates and what capabilities should be there for your sales environment.

Cash Drawers
Receipt Printers
Programmable Keyboards
Barcode Scanning Devices
POS Terminals
Portable Terminals
Barcode Printers



**AT ONLY \$29.95 THIS VIDEO
WILL SAVE YOU THOUSANDS**

Why spend \$\$\$\$\$\$\$\$\$\$ before you learn about Point of Sale and how it works.

Some equipment saves time and money, some equipment doesn't.

Spark your interest in time saving Sales Techniques and Management.

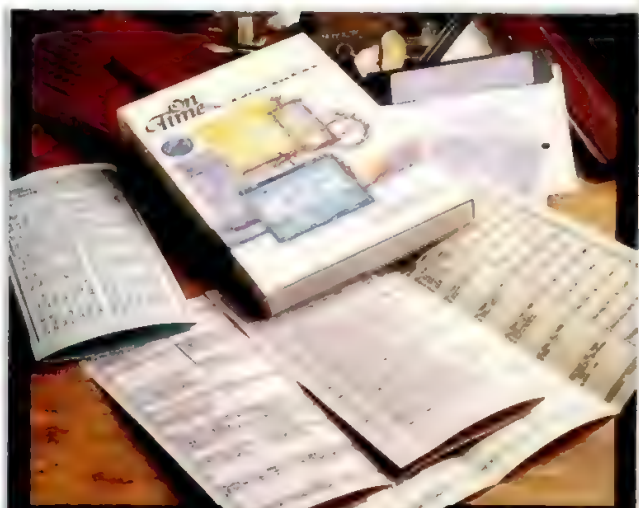
Enjoy better control of your business, and better knowledge of your profits.

What are standard features for "Point of Sale"?????

Knowing what computers and point of sale can do is essential to any business in the 90's.

Computer Time of America 1-800-456-1159 mon-sat
R. D. #3, Box 16
Johnstown, PA 15904

CIRCLE 93 ON READER SERVICE CARD



Stop wasting time
scheduling group
meetings

For a free 30 day
evaluation copy write to
the address below or call:

800-345-6747

OnTime

OnTime® is the finest network calendaring product on the market. It saves you time and aggravation in scheduling group meetings. It instantly communicates with whom you want to meet. OnTime's Laser Calendar Printouts are the talk of the industry — they will knock your socks off!

Campbell Services, Inc.
21700 Northwestern Hwy., #100
Southfield, MI 48075

Stand alone version (non-network)
\$69.95

CIRCLE 94 ON READER SERVICE CARD

ENVISION IT

Raster-to-Vector Conversion Software

Lets you scan into CAD and most
other drawing programs!

(800) 321-ENVY

Before Envision It
Conversion: TIFF
(raster file)



After Envision It
Conversion: DXF
(vector file)



Special Offer

\$299 Envision It (retail \$399)
**\$399 Envision It bundled with The
Complete Half-Page Scanner** (retail \$699)

©1991 E.S.T., Inc. • 822 Mahler Road • Burlingame, CA 94010

CIRCLE 94 ON READER SERVICE CARD

LIMELIGHT

Is where you'll be
with over 786,000+ brand specifiers
after your colorful ad runs here.

Call 1-800-825-4237

RJE+3270+Gateway Print 20,000 lines/minute

Features:

- connect up to six S/370 channel-attached printers
- IBM 3203, 3211, 4245 Xerox 4050, 4090, 8790, 9790 and more
- print spooling
- electronic forms management
- line speeds to 384,000 bps with DATMODE=FULL
- dial-up or dedicated lines

New Product:

BARR/GATE:

- RJE+3270 Gateway
- Up to 250 users
- SDLC, Token Ring, Novell IPX, or NETBIOS connections
- Send/Receive commands
- EHLAPI
- 3287 printers

One call is all you need for the complete solution for your RJE, remote print, and 3270 applications. See for yourself why more than 11,000 users put their trust in BARR products. Call today for a 30-day evaluation.

MORE SPEED MORE FEATURES MORE SOLUTIONS

BARR

Barr Systems, Inc.
4131 NW 28 Lane
Gainesville, FL 32606-6681
800-BARR-SYS or 800-227-7797

CIRCLE 925 ON READER SERVICE CARD

How to Make Great Gray-Scale Images!



Image-In Scan/Paint and Plus provide easy, sophisticated scanning and gray-scale editing—an electronic darkroom running under Windows 3.0 with filters to soften, sharpen, blend and more. Change contrast, adjust 256 gray levels, posterize. Complete control of gray-scale and line art images! Call for your free booklet **HOW TO MAKE GREAT GRAY-SCALE IMAGES!**

Supports these scanners:

Canon
The Complete PC
Compugraphic
HP ScanJet

Epson
IBM 3119
Logitech
NISCA

Maratek
Microtek
Ricoh



**IMAGE-IN
INCORPORATED**

1-800-345-3540

406 E. 79th St. • Minneapolis, MN 55420 • FAX 612-888-3665
Outside N. America call CPl. Geneva ++41-22-436-800
CIRCLE 927 ON READER SERVICE CARD

ENTRYPPOINT

DATA ENTRY FEATURES

- ▶ Headsdown speed
- ▶ Paint-the-screen form design
- ▶ Menu-driven edit selection
- ▶ Field and char type validation
- ▶ Range checks
- ▶ Table lookup
- ▶ Check digits
- ▶ Accumulator balancing
- ▶ Programmable function keys
- ▶ Operator statistics
- ▶ LAN or single station
- ▶ French & German versions

SUPPORT

- ▶ Toll-free support hotline
- ▶ 24-hour electronic bulletin board
- ▶ International distribution and support
- ▶ Award-winning manuals
- ▶ On-site training & consulting

DATALEX

800-962-8688

Circle 926 on Reader Service Card

CIRCLE 926 ON READER SERVICE CARD

DON'T BE BLUE.

Don't think you can't afford
to target over 786,000+ PC buyers
here in color. You can.

Call 1-800-825-4237

FREE FONTS! FOR WORDPERFECT OR WINDOWS



This is the best font deal you'll find anywhere! At \$79.95, Publisher's Powerpak is the least expensive font program on the market. And, if you purchase Powerpak before May 30, we'll send you these 6 great looking scalable typefaces -- a \$90 value -- *absolutely free!*

Eureka

Baxter

Silicon

Merced

Springer



* Send in this offer with your Registration Warranty Card, sales receipt and \$6.00 shipping. Not valid with any other offer. Indicate desired format: ☐ 3 1/2 ☐ 5 1/4



For more information, call

ATECH SOFTWARE

(800) 748-5657

5964 La Place Ct., #125, Carlsbad, CA 92008

CIRCLE 928 ON READER SERVICE CARD

PCM

PC
MAGAZINE

PREVIEW

The Color Showcase
for Leading-Edge PC
Products and Services

AMIDLAG

ADVANCED DIAGNOSTIC UTILITY



August, 1990
AMIDLAG Version 3.14

\$89.95
List Price
286/386/486
Compatible

"...the most comprehensive package that delivered the most accurate results in the shortest time..."

PC Magazine, August, 1990

Complete Diagnostics for:

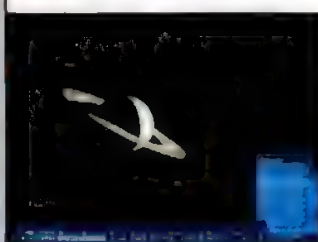
- Memory
- Hard Disk
- Floppy Disk
- Keyboard
- Video
- Ports

WORLDWIDE DISTRIBUTORS

SienerSoft

6540 Lusk Blvd. Suite C-166, San Diego, CA 92121 USA
DEALER INQUIRIES WELCOME 1-800-755-1875

CIRCLE 329 ON READER SERVICE CARD



DANCE OF THE PLANETS™

Space Travel for the Inquiring Mind

New v2.0 The most detailed dynamic sky and solar system model ever created.

1-800-SKY-1642

"An order of magnitude better than any other s.s. simulator..."

John Mosley, *Sky & Telescope*

"Stunningly powerful... closest (to the beauty of the starry sky)"

Ed Mendelson, *PC Magazine*

IBM compatibles, EGA/VGA, \$195. Order/literature/sampler.

A.R.C. Software 303-663-3223 POB 1974P, Loveland CO 80539

CIRCLE 930 ON READER SERVICE CARD

AmortizerPlus 3.0™

- Calculate Any Loan in Seconds
- Compare Loans using "What if?" Scenarios
- Analyze the Future Value of Any Security
- Print Personalized Reports/Schedules



Amortizer Plus - Professionals Count On It.

Call **GoodSoftware** at 1-800-272-4663

CIRCLE 931 ON READER SERVICE CARD



Super VGA

Computer Images

Now VESA/VGA Mode and Animation
1024x768x256
Photographic Quality Resolution Images

ASTRONOMY/NATURE/SCENIC
AND "OTHER" HEAVENLY BODIES!
FULL COLOR VIDEO MOVIES

Experience your computer's maximum graphics ability! NOW a GIF Images for all computers, all resolutions up to 1024x768x256. We're the original, the leader, quality MoviePic™. Use our easy "300" 1000 numbers and your modem.

32 LINE COMMERCIAL BBS

Immediate, Full Access!

1-900-988-1000

Flat Rate 50 cents a minute



Actual computer scanned images

BBS ACCESS: Full, immediate access, we offer 24 Gigabytes of quality Images and MoviePics on a 486/33 EISA system! All you need Images, Utilities, Graphics Programs are available now by modem. No waiting. No registration. No long distance charges. Use any name. No hassles. Only 50 cents a minute period. Everything is billed to your phone. Canada, Overseas call BBS at 503-697-5100. 32 lines always open. We create and offer only Quality Images and Programs.

CATALOG MAIL ORDER: Voice 503-697-7700. Save money by ordering the same Images and programs by mail. We mail anywhere in the world. Ask for our Catalog on a diskette including sample GIF Images, viewer and complete catalog for only \$5; 3 1/2" or 5 1/4", DD or HD. Let us know exact size. For complete Info/Help call Voice 1-900-446-8324 (50 cents/minute).

Event Horizons

311 Ave B, Suite 208
Lake Oswego, OR 97034
Information: 503-687-7708



CIRCLE 932 ON READER SERVICE CARD



Slides From Your PC Try Us FREE!

We want your business. And we'll prove it! We offer the best service available. Experts in Harvard, Freelance, Corel and others on staff to serve you. Free Federal Express shipping. Toll-free Customer Service. And if you should make a mistake, we'll reshoot your slides, free. Call today, and say "I'd like to try your service. Free."

1-800-222-2592



Accent Presentations, Inc.

12780 High Bluff Drive, Ste. 250 • San Diego, CA 92130

IMAGING

from your computer files

Vibrant, high-quality output from your PC software. Dozens of packages supported. Transmit your files anytime. Free reshoots.

Call for free user kit and free trial info.

- 35mm COLOR SLIDES
- COLOR OVERHEADS
- 4x5 8K NEGATIVES & TRANSPARENCIES
- VIDEO OUTPUT



IMAGE CENTER

1-800-433-8829
1011 Second St., S.W. • Roanoke, VA 24016

CIRCLE 934 ON READER SERVICE CARD

Bible Study Software



What does the
Bible say?
And Where?

Verse Search finds any verse in the Bible instantly, searches for any word or phrase, even for concepts using an integrated Thesaurus. Easily finds the exact verse you need for your study. Print or copy text to your own files. Version 5.0 includes unlimited windows and full mouse support.

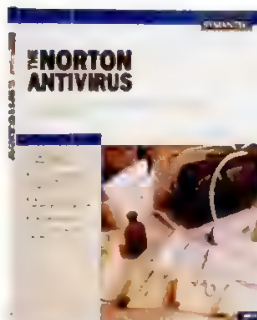
Think of us as a bookstore! Our shelf includes a dozen software tools designed for your area of interest in the Bible. To celebrate our 10th anniversary as the leading Bible software company, we offer a new Bible Dictionary product. Our memory resident Verse Typist transfers verses directly to your word processor. Call for a free brochure!

800-423-1228 512-251-7541

Bible Research Systems

2013 Wells Branch Parkway #304
Austin, Texas 78728

CIRCLE 939 ON READER SERVICE CARD



Peter Norton Antivirus Now Cures Viruses.

- Protects, Detects, and Eliminates Viruses!
- Operates Invisibly!
- FREE 24 Hour Virus Newsline Service!
- 100% Novell & 3Com Compatible!
- Windows Compatible!
- Only \$89!
- Call or Fax Your Order to Dustin Today!

Prices subject to change without notice.



Plain Wrap Prices,
Black Tie Service.

20969 Ventura Blvd., #13
Woodland Hills, CA 91364
(818) 710-9174

Call Toll Free

Monday thru Friday
7:00AM to 5:00PM PST

1-800-274-6611

Or FAX it!

1-818-884-5310

CIRCLE 941 ON READER SERVICE CARD

STATISTICA

CSS/3™ Complete Statistical System with data management and over 1,000 fully integrated presentation-quality graphs; the largest selection of statistics-graphics available in one package; unlimited size of files; means mouse or commands; IBM compatibles; \$595.

Quick CSS™ All basic statistical modules of CSS 3 (incl. data management) and the full presentation-quality graphics capabilities of CSS 3; IBM compatibles; \$295.

CSS:GRAPHICS™ The largest selection of graphs in one package; all graphics capabilities of CSS 3 and, in addition, extended on-screen drawing facilities, inseting, multigraphs, rotating 3D graphs (30 types) with interactive cross sections; special effects; custom designed graphs; IBM compatibles; \$495.

STATISTICA™ A fully integrated system that combines all the capabilities of CSS 3 and CSS:GRAPHICS into a single, extremely comprehensive data analysis package; IBM compatibles; \$795.

STATISTICA/Mac™ A CSS-compatible data analysis and graphics system with data management for the Macintosh (large selection of rotating 3D graphs, on-screen drawing); unlimited size of files; Macintosh compatibles; \$395.

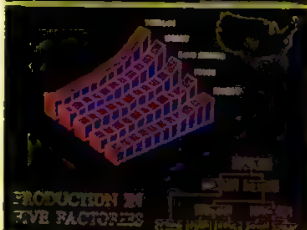
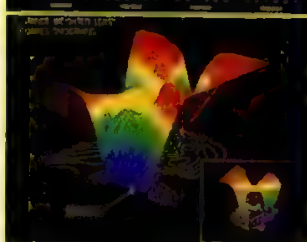
Domestic ship \$7; 14-day money-back guarantee.



StatSoft™

2325 East 13th • Tulsa, OK 74104
(918) 583-4140 • FAX (918) 583-4376

StatSoft of Europe (Hamburg, Germany):
040 4200347, StatSoft UK (London, UK):
0462 482822; StatSoft Pacific (Melbourne,
Australia): 613-966-1766



CIRCLE 940 ON READER SERVICE CARD

IS \$495 TOO MUCH TO ASK FOR A NEW BRAIN?



Tired of sifting through meaningless reports, tables, bar-charts and graphs looking for trends in your business? Just turn KnowledgeSEEKER loose on your database and it will automatically analyse the information, providing you with answers that would normally take days or weeks to find. So you save time as well as money. Find out more about KnowledgeSEEKER — the brainy PC software at a price that doesn't smart.

Knowledge SEEKER™

1-800-387-7335 FREE DEMO DISK

1-613-723-8020 Fax 1-613-723-8048

FirstMark Technologies Ltd

680 14 Concourse Gate, Ottawa, Ontario K2F 7S8

"The analysis time
saved will be well
worth the cost of the
software."

BYTE Magazine Review,
Feb. 1991

DECISION MAKING SOFTWARE

CIRCLE 942 ON READER SERVICE CARD

The
Ultimate
386/486
memory
manager!

\$99.95

Order
Now

1-800
662-8266

Memory Commander

Memory Control
for 386 and 486 PCs



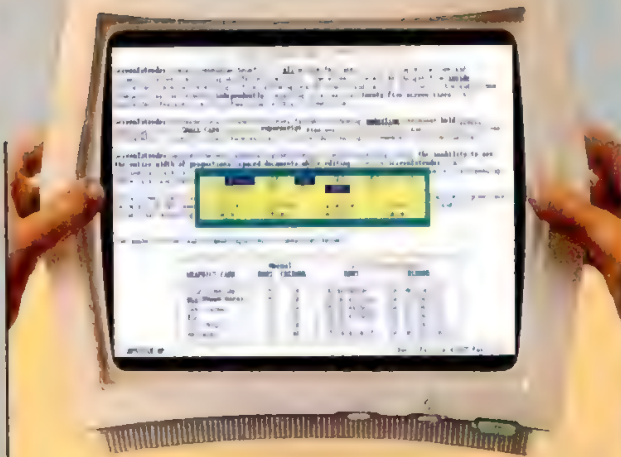
The only way to get
900K of contiguous DOS

Memory Commander

Complete memory management services, including EMS, XMS, VCPI & integrated RAM disk. The only memory manager providing 900K of contiguous DOS memory. Automatically Loads TSRs & device drivers high. Selects the best memory model for each program, on-the-fly, without user intervention or rebooting.



V Communications Incorporated
4320 Stevens Creek Blvd. Suite 275-PC
San Jose CA 95129
408.296.4224



STRETCH

WordPerfect® 5.0/5.1 With New ScreenExtender™ 2.0

ScreenExtender 2.0 lets you edit the entire width of proportionally spaced documents with no left/right scrolling.

New Version 2.0 is faster, more readable, and takes less memory. Up to 25 screen sizes and 128 characters per line are available. Shows italics, underline, small large and other attributes on-screen as you edit. Five new display fonts. Select from 64 colors on SVGA/VGA/EGA. Change screen sizes on demand. And more!

CIRCLE 944 ON READER SERVICE CARD

ONLY \$99.95

30-Day Money-Back Guarantee
Order Now! (800) 782-4792

Visa/MC/AmEx. Add \$5 S/H. VA res. add 4% sales tax. Version 2.0 supports SVGA (800x600), VGA, EGA, UGA, Hercules and Gas Plasma (640x400) standards.

Stairway Software Inc.

700 Harris Street, Suite 204,
Charlottesville, VA 22901

(804) 977-7770 • FAX (804) 979-3749

Don't Buy a New Disk Drive!

Introducing **SuperStor™**—The Disk Capacity Maximizer for PC/XT/ATs, PS/2s, and compatibles running DOS 3.x and 4.x. Now you can increase your hard disk and floppy disk capacity, ON-THE-FLY, up to 300% or more! This easy-to-install program can reliably, safely, and totally transparently increase your storage capacity without buying a new drive and controller, and without opening your computer.



- Reduces the number of floppies required for backup by 50% or more.
- Disk Defragmentation program included free (a \$50 value).
- Great for laptops. Super for spreadsheets. Perfect for word processing.
- FASTEST COMPRESSION SOFTWARE AVAILABLE.

Introductory Price Only \$99.95!

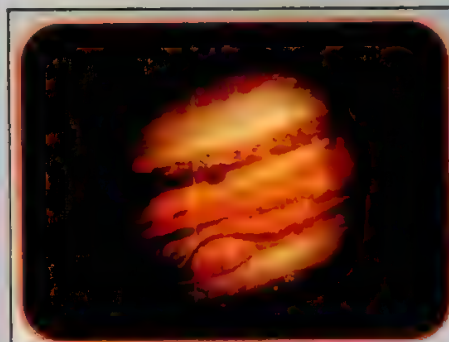
Order Today! Call 1-800-732-3133.

Regular price \$119.95. Visa/MasterCard accepted.



AddStor, Inc. Fax 415-688-0466
3905 Bohannon Dr., Menlo Park, CA 94025

CIRCLE 943 ON READER SERVICE CARD



Zoom in on
breathtaking
views from
our solar
system and
of deep
space.

EZCosmos 3.0

Using its unique Skyplot, EZCosmos displays more than 10000 celestial objects, including the sun, moon, planets, stars, constellation lines and deep space objects. Find any object and a pop-up window displays its constellation name, common name, magnitude, right ascension and declination, altitude and azimuth, and rise and set times.

Zoom in on binary stars. Verify historical observations. Watch solar eclipse animations. Restrict the skyplot to display just the navigational stars. View the names of the brighter stars and all 88

constellations on the screen, and print your star chart on any dot-matrix or laserjet printer.

EZCosmos 3.0 gives you the universe for only \$69.95. It's available at your favorite software store, or you may order directly from Future Trends Software.

For more information, call:
800-869-3279 - Sales
214-224-3288 - Int'l Sales
214-224-3279 - VOX/FAX
or write to:

Future Trends Software, Inc.
1601 Osprey Dr. Suite 102
Desoto, TX 75115

© 1991 Future Trends Software

EZCosmos is a Trademark of Astrosoft, Inc.

CIRCLE 945 ON READER SERVICE CARD

PREVIEW

The Color Showcase
for Leading-Edge PC
Products and Services



LABEL MASTER™

**Print Perfect Labels and Forms In-House
On Almost Any Printer**

- WYSIWYG layout • Money back guarantee
- Supports matrix, laser, thermal printers
- Supports most bar codes and text fonts
- Supports graphics images
- Label Master - \$479 • Quick Draw - \$259
- Developers library with source - \$389

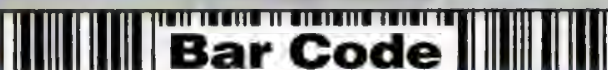
THE **COMPUTER**
CONNECTION

P.O. Box 634 • Eau Claire, WI 54702
(715) 833-2331 • Fax: (715) 833-1995

(800) 552-2331



CIRCLE 946 ON READER SERVICE CARD



Bar Code

**Print Bar Codes
from your PC**

PrintBar II prints Code 39, UPC, EAN,
2 of 5 bar codes directly from your
programs in DBase, C, BASIC, etc. on
Epson, HP LaserJet printers. **\$295**



Keyboard wedge and portable Bar Code Readers from **\$395**

Free Information & Brochures

916-622-4640 • Fax 916-622-4775

BearRock

6069 Enterprise Drive, Diamond Springs, CA 95619-9394

CIRCLE 947 ON READER SERVICE CARD

Bar Code Soft-Fonts

On-Tap™ lets you
print many different types
of bar codes on a wide variety
of printers from your PC. Call
today and order!

\$195

1-508-339-4928.



Automatic Identification Division
171 Forbes Blvd, Mansfield, MA
02048. FAX: (508) 339-2275

© 1991, Integrated Software Design, Inc.

CIRCLE 948 ON READER SERVICE CARD

DON'T BE BLUE.

Don't think you can't afford
to target over 786,000+ PC buyers
here in color. You can.

Call 1-800-825-4237

**SOME SAY
THEIR SERVICE
AT ABOUT \$10.00/HOUR
IS AS ECONOMICAL
AS OUR BBS AT
\$9.95/MONTH
WE SAY
B.S.**

CRS CANADA
REMOTE
SYSTEMS

FOR A FREE CRS ON-LINE DEMONSTRATION, CALL

(416) 798-4713

For more information, call
U.S. Only: 1-800-465-7562
Canada Wide: 1-800-465-6443
Ontario & Quebec: 1-800-465-9501
Toronto Area: (416) 620-1439

CIRCLE 949 ON READER SERVICE CARD

**PRETTY
IN
PINK**

Your ad will
look great here
in any color.
Place it now
at B&W rates.

Call 1-800-825-4237

The Color Showcase
for Leading-Edge PC
Products and Services

HARDWARE/ADD-ON-BOARDS

MEMORY UPGRADES - NEW PRODUCTS

IBM PS/2 Memory
2.4Mb Modules -- Models P-75,90,95
2Mb Upgrade --- Model 25/286

IBM RISC 6000 Memory
16, 32Mb Upgrade --- Models 320,
520, 530, 550,730, 930

IBM PS/2 CPU Upgrade
386™SX™16MHz -- Models 50 & 60

COMPAQ Memory
1, 4Mb Modules ----- LTE386s/20
1, 2, 4Mb Modules ----- SLT386s/20

AST Memory
8Mb Kit ----- Premium 486/33
1, 4Mb Modules ----- Premium Exec.
1, 4Mb Modules ----- Premium II
2, 4Mb Modules ----- Bravo 486/25
1, 4Mb Modules ----- Cupid Mem Brd

CANON Laser Printer
1, 1-2, 4Mb Modules ----- LBP-4
1, 2, 3Mb Modules ----- LBP-8III

OKIDATA OKILaser
1, 1-2, 4Mb Modules ----- LBP-4
1, 2, 3Mb Modules ----- LBP-8III

PANASONIC Laser Printer
1, 2Mb Modules ----- 4420, 4450I

Toshiba Memory
1, 2Mb Modules ----- T1000LE
8Mb Upgrade ----- T5200,T8500

HP 9000 (APOLLO)
4, 8, 16, 32Mb Kits ----- 400 Series
DATA GENERAL AVIION
4, 8, 16Mb Kits - Terminals & Servers
SILICON GRAPHICS
32Mb Kit ----- IRIS Graphics Series

SIGMA DATA
Scitheyville Row • P.O. Box 1790 • New London, NH 03257
Established - 1980 NH (603)526-6909 FAX (603)526-6915

5-YEAR WARRANTY! - 30-DAY MONEY BACK GUARANTEE
IMMEDIATE DELIVERY! - 24-HOUR REPLACEMENT
TOLL FREE **800-446-4525**
VISA, MC, AMEX, COD, Qualified PO's

CIRCLE 551 ON READER SERVICE CARD

LAPTOP MEMORY UPGRADES		FAX MODEMS	
COMPAQ	15100 2MB 15200 T8500 2MB 8MB	COMPAQ	MAX FAX9624L1 C 9600bps,2400bps Group III
386 20 1MB 2MB 4MB	ZENITH	IBM & Compatibles	MAX FAX9624 9600bps,2400bps Group III
Portable III 512KB 2MB	SuperSport SX 2MB	MAXLITE PC (Portable)	9600bps,2400bps Group III
SLT 286 1MB 4MB	SuperSport286 1MB	TOSHIBA	MAX FAX9624L1 T 9600bps,2400bps Group III
SLT 386 1MB 2MB 4MB	SuperSport386e 2MB 4MB		
LTE 286 1MB 2MB 4MB	1MB 4MB		
TOSHIBA	MEMORY		
T1000SE XE 1MB 2MB	SIMMS (1MB 4MB) x 8 x 80ns		
T1200XE 2MB	SIMMS (1MB 4MB) x 9 x 80ns		
T1600 2MB	PRINTER MEMORY		
T3100e 512KB 2MB	Apple, Canon, Epson, HP,		
T3100SX 2MB 4MB	IBM, Okidata, Panasonic,...		
T3200 3MB			
T3200SX 2MB 4MB			

ADD-ON AMERICA Toll Free 800-292-7771
433 N. Mathilda Avenue, Sunnyvale, CA 94088
TEL (408) 746-1590 FAX (408) 746-1593

CIRCLE 552 ON READER SERVICE CARD

Memory - Laser Printer - Memory - Laptop - Memory -

4MB Capacity Expandable Memory Board : 1/2 4MB Memory Upgrade for Notebook

- HP LaserJet II, IIO, IIP, III and IIID
- Panasonic 4420, 4450I and 4450
- IBM 4019 and 4019E
- OKIDATA Okilaser 400/800
- EPSON EPL-6000, Toshiba PageLaser6
- Toshiba T1000SE/XE/LE
- Toshiba T1200XE
- Toshiba T2000SX
- Compaq LTE/286
- Compaq LTE/386

EXP Computer, Inc. 516-496-3703 Fax 516-496-2914
CIRCLE 553 ON READER SERVICE CARD

COMPUTER SYSTEMS

SAVE SAVE SAVE SAVE SAVE SAVE
LAPTOP SPECIALS
AND LOW, LOW PRICING

LATEST LAPTOP and NOTEBOOK MODELS
TOSHIBA • ZENITH • NEC • COMPAQ
SHARP • TI • EPSON • PANASONIC
MITSUBISHI • SAMSUNG
TANDON • SANYO

Convenient one-stop shopping for all your laptops,
accessories, and upgrades!
ORDER BEFORE 5:00 PM FOR SAME DAY SHIPPING
NEXT DAY DELIVERY AVAILABLE
OPEN MON-FRI 9AM-6PM SAT 9AM-5PM
FAST FRIENDLY & DEPENDABLE SERVICE

COMPUTER OPTIONS
UNLIMITED

12 Maiden Lane
Bound Brook, NJ 08805

1-800-424-7678 TO ORDER
LOW PRICES FROM THE LAPTOP SPECIALISTS
908-469-7678 FOR INFO.

SAVE SAVE SAVE SAVE SAVE SAVE

CIRCLE 554 ON READER SERVICE CARD

50 MHz 80486 EISA Motherboard

- 486™25/33/50 MHz, with 8K internal cache, MMU & FPU
- Optimized EISA Bus
- 33 Mbytes/sec DMA & Bus Master Transfer
- Secondary Refreshed Optimized Copy-Back Page Accessed Cache Architecture
- Scalable 64K to 256K fast SRAM
- Up to 64Mb of 32bit memory on board
- Built-in IDE HD option
- Built-in 2 serial and 1 parallel ports
- Supports Waitok 4167
- 6 EISA and 2 ISA slots
- Compatible with UNIX/XENIX, OS/2, Novell and Windows 3.0
- One year full warranty
- Complete documentation
- OEM and Distributors welcome

MaxR Technologies, Inc.
1700 Wyatt Dr. #12, Santa Clara CA 95054
Tel (408) 496-MaxR(6297) Fax (408) 496-1063

CIRCLE 555 ON READER SERVICE CARD

COMPUTER SYSTEMS

486-33 MHz CACHE

Since 1985, MSE has been dedicated to bringing you high-quality American designed, engineered and built computer systems for a wide range of applications. NOW, for our 8th year anniversary special, we are proud to introduce our fastest and most powerful machine, the 80486-25MHz or 33MHz.

MicroCache 386 \$1995

- Intel 80386-33MHz CPU
- 385-33MHz CACHE Controller
- 4MB RAM, expands to 32MB
- 200MB Fast Dr. (15ms)
- 1.2MB Floppy Dr.
- 2 Serial/Parallel
- Enhanced Keyboard
- 58.5MHz Landmark
- 128K Cache Option

MicroCache 486-25MHz

- 80486 25CPU 4MB RAM
- 1.2MB Floppy Dr
- 125MB Fast Dr (18ms)
- 64K Cache (25ns)
- Enhanced Keyboard
- 486 33MHz Option

\$2295

MicroCache 386SX-20MHz

- 386SX 20 CPU 1MB RAM
- 1.2MB Floppy Dr
- 84MB Fast Dr (18ns)
- Serial Parallel
- Enhanced Keyboard
- 30MHz Landmark

\$1095

Motherboard Special

386SX-16MHz W 1MB RAM \$399

386SX-20MHz W 32K Cache 1MB RAM \$499

386-33MHz W 64K Cache 4MB RAM \$999

486-25MHz W 64K Cache 4MB RAM \$1599

486-33MHz W 64K Cache 4MB RAM \$1999

Micro 386SX-16MHz

- 80386 CPU 1MB RAM
- 1.2MB Floppy Dr
- 42MB Fast Dr (22ms)
- Serial Parallel
- Enhanced Keyboard
- 20MHz Landmark

\$895

SALES HOURS:
Monday - Friday
9:00 AM - 5:30 PM
Saturday
10:00 AM - 3:00 PM
PST

MS ENGINEERING, INC.
10601 S. De Anza Blvd., Suite 214
Cupertino, CA 95014
(408) 257-4249 FAX: (408) 257-4398

CIRCLE 556 ON READER SERVICE CARD

SCHWAB 486-25/33MHz SYSTEM

*BUILT-IN MATH COPROCESSOR *1MB RAM UPGRADABLE TO 16MB
*128K EXT. CACHE *1.2MB DR *DELUXE CASE
*IDE CONTROLLER *ONE YEAR PARTS & LABOR WARRANTY

\$1795/2255

*89/124/200MB HARD DISK---\$375/475/625 *1024x768 SVGA---\$375 *1MB VGA---\$145

SCHWAB COMPUTER CENTER 7200 EAST EL CAMINO REAL, SUITE 214, CA 94011
TEL (408) 245-0886 FAX (408) 245-2753

CIRCLE 557 ON READER SERVICE CARD

Calling about an ad? Say you saw it in
PC Magazine Classified

ONE YEAR
WARRANTY

AMT INTERNATIONAL

LOWEST PRICE
SAME DAY
SHIPPING

2393 QUME DRIVE, SAN JOSE, CA 95131

(408) 432-1790 • (408) 432-0552 Fax: (408) 944-9801

COMPUTER SYSTEMS

AMT 486-25 MHz w/128K Cache

1MB RAM
90 MB SCSI HARD DISK
MATH Co-PROCESSOR SOCKET
1:1 2HD/FD CONTROLLER
1.2 OR 1.44 FLOPPY DRIVE
VO 2S/P/G/ PORT
101 KEY BOARD
FULL TOWER CASE
w/230 P/S
SUPPORT UNIX, XENIX,
DOS, OS/2, NETWORK

\$2899

AMT 386-33 MHz w/64K Cache

1MB RAM
40 MB HARD DISK
INTEL 386-33 MHz CPU
MATH Co-PROCESSOR SOCKET
1:1 2HD/FD CONTROLLER
1.2 OR 1.44 FLOPPY DRIVE
VO 2S/P/G/ PORT
101 KEY BOARD
MINI-TOWER CASE w/200 P/S
SUPPORT UNIX, XENIX,
DOS, OS/2, NETWORK

\$1399

AMT 386-25 MHz w/40 MB Hard Disk

1MB RAM
40 MB HARD DISK
INTEL 386-25 MHz CPU
MATH Co-PROCESSOR SOCKET
1:1 2HD/FD CONTROLLER
1.2 OR 1.44 FLOPPY DRIVE
VO 2S/P/G/ PORT
101 KEY BOARD
AT CASE W/200 P/S
SUPPORT UNIX, XENIX,
DOS, OS/2, NETWORK

\$1249

AMT 386SX-16 MHz w/40 MB Hard Disk

1MB RAM
40 MB HARD DISK
INTEL 386SX-16 MHz CPU
MATH Co-PROCESSOR SOCKET
1:1 2HD/FD CONTROLLER
1.2 OR 1.44 FLOPPY DRIVE
VO 2S/P/G/ PORT
101 KEY BOARD
AT CASE w/200 P/S
SUPPORT UNIX, XENIX,
DOS, OS/2, NETWORK

\$1045

**COMPUTER SYSTEMS: VGA MONITOR AND VGA
16 BIT CARD (1024 x 768) \$445**

MEMORY UPGRADES

COMPAQ MEMORY

DeskPro 285-E, 385-30/20E/25	
1MB 113131-001	\$139.00
4MB 113132-001	\$369.00
DeskPro 285N, 385N and 385SX	
2MB 118689-001	\$225.00
4MB 118690-001	\$590.00
DeskPro 385S	
1MB 113646-001	\$139.00
4MB 112534-001	\$369.00
DeskPro 386-33, 486-33 & SystemPro	
2MB 115144-001	\$225.00

AST MEMORY

Bravo-286, Workstation	
512K Kt 500510-010	\$59.00
2MB Kt 500510-002	\$172.00
Premium 386-16/20C	
1MB Kt 500510-007	\$95.00
4MB Kt 500510-008	\$369.00
Premium 386-20	
1MB Kt 500510-003	\$150.00
4MB Kt 500510-004	\$369.00
Bravo-386SX	
2MB Kt 500510-002	\$172.00
4MB Kt 500510-008	\$369.00
Premium 386-SX/25/33 & 486-25	
1MB 500719-002	\$80.00

HEWLETT-PACKARD MEMORY

Vectra GS/16S	
1MB D1540A	\$112.00
4MB D1542A	\$349.00
Vectra GS/20PC, RS/25PC and 20C	
1MB D1640A	\$126.00
4MB D1642A	\$365.00
Vectra 486PC	
1MB D2150A	\$115.00
4MB D2151A	\$390.00

IBM PS 2 MEMORY

Model 30-286, Exp. Board 1407250	
512 K Kt 30F5348	\$54.00
2MB Kt 30F5360	\$175.00
Model 70-E61/121, 55SX, 65SX	
1MB 6450603	\$95.00
Model 70-E61/121, 50Z, 55SX, 65SX	
2MB 6450604	\$179.00
Model 55SX, 65SX, 34F3077 & 34F3011	
4MB 34F2933	\$485.00
Model 70-A21	
2MB 6450600	\$170.00
Model 80-141	
1MB 6450375	\$145.00
Model 80-111/311	
2MB 6450379	\$269.00
All Models 70 and 80	
2-8MB w/2M 6450605	\$499.00
2-14MB w/2M34F3077	\$599.00
2-16MB w/4M34F3077	\$999.00
Model 50, 50Z, 55 SX & 60	
2-8MB 1497250	\$599.00

LASER PRINTER MEMORY

Hewlett-Packard Laser Jet HP & II	
1MB 33474B	\$130.00
2MB 33475B	\$150.00
4MB 33477B	\$199.00
Hewlett-Packard Laser Jet HP & II	
1MB 33443B	\$135.00
2MB 33444B	\$150.00
4MB 33445B	\$199.00
IBM Laser 4019 and 4019e	
2MB 1039137	\$369.00
3.5MB 1038675	\$469.00
Canon LBP-8L, 8MR, 8RT	
2MB S63-1880	\$225.00
4MB Part N/A	\$439.00

LAPTOP AND PORTABLE MEMORY

TOSHIBA MEMORY	
1MB Model 1000SE/XE	\$329.00
2MB Model 1000SE/XE	\$469.00
2MB Model T1200XE	\$289.00
2MB Model T1800	\$289.00
2MB Model T3100E	\$175.00
2MB Model T3100SX	\$175.00
4MB Model T3100SX	\$689.00
2MB Model T3200SX	\$175.00
4MB Model T3200SX	\$689.00
2MB Model 5100	\$289.00
2MB Model T5200, T8500	\$185.00
8MB Model T5200, T8500	\$1300.00

ZENITH MEMORY	
1MB SuperSport 286 & 286E	\$199.00
2MB SuperSport 286 & 286E	\$455.00
2MB SuperSport SX/Alpha	\$455.00
4MB SuperSport SX/Beta	\$455.00

COMPAQ MEMORY	
1MB Portable LTE 286	\$195.00
2MB Portable LTE 286	\$299.00
1MB SLT-286	\$245.00
4MB SLT-286	\$1395.00

NEC MEMORY	
1MB Prospeed 286	\$270.00
2MB Prospeed 386	\$450.00

ZENITH MEMORY

Zenith Z-386/20/25/33 & 33E	
1MB ZA36/3800ME	\$99.00
4MB ZA3800MK	\$675.00
Zenith Z-386/20/25 & 33	
2MB ZA3600ME	\$199.00
Zenith Z-386 SX	
2MB Z-606-1	\$255.00

MATH COPROCESSORS

INTEL	
8087-5MHz	\$80.00
8087-2 6MHz	\$116.00
8087-1 10MHz	\$155.00
80287-6 6MHz	\$130.00
80287-6 8MHz	\$185.00
80287XL 8/10MHz	\$185.00
80287XTL 12 MHz (Laptop)	\$210.00
80287-10 10MHz	\$185.00
80C287-12 12MHz	\$195.00
80387SX-16	\$289.00
80387SX-20	\$310.00
80387DX-20	\$340.00
80387DX-25	\$425.00
80387DX-33	\$525.00

WEITEK	
3187-20 20MHz	\$300.00
3187-25 25MHz	\$350.00
3187-33 33MHz	\$500.00
4187-25MHz	\$800.00
4187-33MHz	\$1050.00

CYRIX	
83087-16 16MHz	\$260.00
83087-20 20MHz	\$295.00
83087-25 25MHz	\$360.00
83087-33 33MHz	\$440.00
83SX87-16 16MHz	\$235.00
83SX87-20 20MHz	\$290.00

IT	
8C87-8	\$165.00
8C287-10	\$175.00
8C287-12	\$200.00
8C287-20	\$230.00
8C387-20	\$265.00
8C387-25	\$350.00

AMD	
80C287-10	\$110.00
80C287-12	\$130.00

DRAM

DRAM 1MGX1	DRAM 64K4	DRAM 286X4
1 MGX1-120NS \$5.00	4164-15 \$1.50	256X4-120NS \$5.00
1 MGX1-100NX 5.25	4164-12 1.99	256X4-100NS 5.50
1 MGX1-80NX 5.50	4164-10 2.50	256X4-80NS 5.75
1 MGX1-70NX 5.75		286X4-STATIC COL
1 MGX1-60NX 7.50	DRAM 286X1	5125AP-10 \$2.99
	256X1-150NS \$1.79	AAA 2800-08 3.00
	256X1-120NS 1.99	AAA 2800-07 3.25
	256X1-100NS 2.00	AAA 2800-04 4.50
	256X1-80NS 2.25	1X4-80 ZIPP 35.00
	256X1-70NS 2.35	1X4-80STT ZIPP 38.00
	256X1-60NS 3.99	1X4-70STT ZIPP 38.00

SIMM MODULES

IBM TYPE	256x9-10 18.00
Add \$2.00 for RIPP	256x9-80 18.00
4Mx9-80 \$265.00	256x9-60 23.00
1Mx9-60 60.00	
1Mx9-10 45.00	APPLE-MAC
1Mx9-80 49.00	1Mx9-70 \$50.00
1Mx9-70 51.00	1Mx9-10 \$40.00
256x9-70 20.00	1Mx9-80 \$45.00
	4x9-80 \$250.00

MICRO- PROCESSORS

68020 16MHz ... \$129.00
20MHz 169.00
25MHz 179.00
33MHz 199.00
68030 16MHz 129.00
25MHz 199.00
68010 16MHz 80.00

CPU CHIPS

80386DX-16 \$250.00	80286-8 (PLCC) 15.00
80386DX-20 275.00	80286-10 (PLCC) 18.00
80386DX-25 325.00	80286-12 (PLCC) 20.00
80386DX-33 355.00	82385-20 84.00
80386-16 230.00	82385-33 75.00
80386-20 235.00	V-20-8 6.00
80486DX-25 (B) 630.00	V-20-10 10.00
80486DX-33 (B) 1150.00	V-30-10 10.00

COMPUTER SYSTEMS

USED PC's! BOUGHT & SOLD!

- WE BUY USED PC's AT TOP DOLLAR!
- WE SELL REFURBISHED PC's CHEAP!
- MOST BRANDS. CALL FOR QUOTE!

RENTEX INC., BOSTON, MA
(800) 545-2313 or (617) 423-5567

CIRCLE 567 ON READER SERVICE CARD

XT CLONE 10MHZ 640K 20MB MONO SYS	\$599
286 12MHZ 1MB RAM 40MB MONO SYS	\$734
386SX 16MHZ 1MB RAM 40MB VGA SYS	\$1275
386 25MHZ 3MB RAM 60MB VGA SYS	\$1930
486 33MHZ 4MB RAM 100MB VGA SYS	\$2912
SEAGATE ST-251 1 40MB 25MS HD	\$229
SEAGATE ST-4086 20MB 17MS HD	\$495
SEAGATE ST-1144A 124MB IDE 3.5" 19MS	\$569
MITSUBISHI MR535 60MB RLL 28MS HD	\$255
W. DIGITAL WD 93044A 40MB IDE AT 28MS	\$219
WD CAVIAR WDAC 28032R 60MB IDE 1" 18MS	\$489
CONNER CP3044 42MB IDE AT 25MS HD	\$299
CONNER CP3184 84MB IDE AT 25MS HD	\$459
CONNER CP3104 103MB IDE AT 25MS HD	\$499
CONNER CP3204 210MB IDE AT 19MS HD	\$799
FUJITSU 1 2MB FLOPPY DRIVE 5.25"	\$58
FUJITSU 1 44MB FLOPPY DRIVE 3.5"	\$59
FUJITSU 101 CLICK KEYBOARD 4700	\$42
MANARD 10105, 90270, 90301, 94001	CALL

DMC 1234 South St.
Long Beach, CA
90805
Tel: (213) 422-4444
Fax: (213) 422-7676
In 422-4643

CIRCLE 568 ON READER SERVICE CARD

DISKETTES

BUY A BETTER BULK DISKETTE

NAME BRAND BULK

VERBATIM	100	200
5.25 DS/DD	24¢	27¢
5.25 HD	52¢	50¢
SONY		
3.5 DS/DD	50¢	49¢
3.5 HD	\$1.19	\$1.16

PREMIUM GENERIC

100% CERTIFIED, HIGH QUALITY	100	200
5.25 DS/DD	24¢	23¢
5.25 HD	38¢	37¢
3.5 DS/DD	39¢	38¢
3.5 HD	79¢	78¢

100% GUARANTEED
media source SINCE 1986

800-356-2553
FAX (404) 952-1432

CIRCLE 569 ON READER SERVICE CARD

DISKETTES

5.25 DISKS

DS/DD	29¢ ea.
DS/HD	55¢ ea.



FREE T-SHIRT with \$200.00 order

Turn Over A New Leaf!

GREENLEAF
computer products, inc.
1-800-722-2989

CIRCLE 570 ON READER SERVICE CARD

3.5 DISKS

DS/DD	58¢ ea.
DS/HD	\$1.25 ea.

DATA CARTRIDGES

QD-2000	\$15.95 ea.
QD-2040	\$16.95 ea.
QD-300XLP	\$17.95 ea.
QD-6150	\$21.50 ea.

8MM Tapes, 4MM Tapes,
Optical Disk, Fax Paper,
Ribbons, Disk Cases

FORMATTED DISKETTES BAS, VERBATIM, SONY

WITH FORMAT	QTY 250 MIX & MATCH	WITHOUT FORMAT
\$.44	5.25" DS/DD	\$.39
\$.69	5.25" DS/HD	\$.59
\$.65	3.50" DS/DD	\$.56
\$1.19	3.50" DS/HD	\$1.09

- FREE FORMATTING on First Order
- TYPEC SLEEVES & Labels Included
- COLORED MEDIA Please Add \$.05
- PRIVATE LABELING Available
- SAME DAY Shipping
- MONEY BACK GUARANTEE

800-255-3142

Diversified Systems Group, Inc.
PO Box 1114, Issaquah WA 98027

CIRCLE 573 ON READER SERVICE CARD

MAXELL • SONY VERBATIM • BASF

100% CERTIFIED LIFETIME WARRANTY

5 1/4" DS/DD	\$.39 each
5 1/4" DS/HD	.59 each
3 1/2" DS/DD	.59 each
3 1/2" DS/HD	1.04 each

Price based on max/match qty. of 300 in bulk
includes Tyvek sleeves and label kits

PREFORMATTED • COLORS • TAPES

800-222-0490

In NJ 201-462-7628 FAX 201-462-5658

• 24 Hour Shipment •

MEGAsoft

P.O. Box 710, Freehold, NJ 07728

CIRCLE 571 ON READER SERVICE CARD

SOFTWARE PACKAGING

- Custom & Stock Product Boxes
- We have the solution to your software packaging needs
- Graphic & Product design available
- Plain or Printed one color to four color process
- Small quantity orders accepted

Call now for information or to order
1-800-443-7712

715 E. Washington St. West Chester, PA 19380

Unipak

CIRCLE 572 ON READER SERVICE CARD

EXPANSION UNITS

ROM BIOS UPGRADES

Complete Upgrades For Your IBM or Compatible

ROM BIOS FEATURES

THE ROM BIOS UPGRADES SUPPORT 300K, 720K, 1.2MB & 1.44MB FLOPPY DISK DRIVES. COMPLETE SETUP IN ROM. EGA AND VGA SUPPORT. OPTIONAL BUILT-IN DIAGNOSTICS IN ROM. IBM COMPATIBLE. NETWORK COMPATIBLE. SUPPORTS UP TO 48 DIFFERENT TYPES OF HARD DRIVES PLUS TWO USER DEFINED. IN-401 & 102 KEYBOARD SUPPORT. 100% IBM COMPATIBLE. SUPPORTS SPEEDS UP TO 33 MHz. FULL DOS/2 SUPPORT. FULL MICROSOFT WINDOWS SUPPORT. COMPLETE DOCUMENTATION. LATEST VERSIONS. UPGRADING A BIOS CHIP IS RELATIVELY EASY. EVEN A PERSON WITH NO COMPUTER EXPERIENCE CAN DO IT. WE ARE THE LARGEST STOCKING BIOS DISTRIBUTOR IN AMERICA!

XT BIOS UPGRADES

AMI XT BIOS	49.95	PHOENIX XT BIOS	49.95
-------------	-------	-----------------	-------

AT 286 BIOS UPGRADES

AMI 286 BIOS	49.95	PHOENIX 286 BIOS	49.95
--------------	-------	------------------	-------

AMI 286 CHIP & TECH BIOS	49.95	PHOENIX 286 CHIP & TECH BIOS	49.95
--------------------------	-------	------------------------------	-------

AMI 286 286 BIOS	49.95	PHOENIX 286 286 BIOS	49.95
------------------	-------	----------------------	-------

AMI 286 286 BIOS	49.95	PHOENIX 286 286 BIOS	49.95
------------------	-------	----------------------	-------

AT 386 BIOS UPGRADES

AMI 386 BIOS	49.95	PHOENIX 386 BIOS	49.95
--------------	-------	------------------	-------

AMI 386 CHIP & TECH BIOS	49.95	PHOENIX 386 CHIP & TECH BIOS	49.95
--------------------------	-------	------------------------------	-------

AMI 386 386 BIOS	49.95	PHOENIX 386 386 BIOS	49.95
------------------	-------	----------------------	-------

AMI 386 386 BIOS	49.95	PHOENIX 386 386 BIOS	49.95
------------------	-------	----------------------	-------

IBM BIOS UPGRADES

AMI IBM XT BIOS	59.95	PHOENIX IBM XT BIOS	59.95
-----------------	-------	---------------------	-------

AMI IBM AT BIOS	89.95	PHOENIX IBM AT BIOS	89.95
-----------------	-------	---------------------	-------

AMI IBM AT BIOS	89.95	PHOENIX IBM AT BIOS	89.95
-----------------	-------	---------------------	-------

KEYBOARD BIOS UPGRADES

XT KEYBOARD BIOS	34.95
------------------	-------

AT KEYBOARD BIOS	34.95
------------------	-------

AMI CACHE MOTHERBOARDS

AMI 486 SX 32 MB	\$99.00
------------------	---------

AMI 486 SX 64 MB	CALL
------------------	------

AMI 486 SX 128 MB	CALL
-------------------	------

AMI 486 SX 256 MB	CALL
-------------------	------

AMI 486 SX 512 MB	CALL
-------------------	------

AMI 486 SX 1024 MB	CALL
--------------------	------

AMI 486 SX 2048 MB	CALL
--------------------	------

AMI 486 SX 4096 MB	CALL
--------------------	------

AMI 486 SX 8192 MB	CALL
--------------------	------

AMI 486 SX 16384 MB	CALL
---------------------	------

AMI 486 SX 32768 MB	CALL
---------------------	------

AMI 486 SX 65536 MB	CALL
---------------------	------

AMI 486 SX 131072 MB	CALL
----------------------	------

AMI 486 SX 262144 MB	CALL
----------------------	------

AMI 486 SX 524288 MB	CALL
----------------------	------

AMI 486 SX 1048576 MB	CALL
-----------------------	------

AMI 486 SX 2097152 MB	CALL
-----------------------	------

AMI 486 SX 4194304 MB	CALL
-----------------------	------

AMI 486 SX 8388608 MB	CALL
-----------------------	------

AMI 486 SX 16777216 MB	CALL
------------------------	------

AMI 486 SX 33554432 MB	CALL
------------------------	------

AMI 486 SX 67108864 MB	CALL
------------------------	------

AMI 486 SX 134217728 MB	CALL
-------------------------	------

AMI 486 SX 268435456 MB	CALL
-------------------------	------

AMI 486 SX 536870912 MB	CALL
-------------------------	------

AMI 486 SX 1073741824 MB	CALL
--------------------------	------

AMI 486 SX 2147483648 MB	CALL
--------------------------	------

AMI 486 SX 4294967296 MB	CALL
--------------------------	------

AMI 486 SX 8589934592 MB	CALL
--------------------------	------

AMI 486 SX 17179869184 MB	CALL
---------------------------	------

AMI 486 SX 34359738368 MB	CALL
---------------------------	------

AMI 486 SX 68719476736 MB	CALL
---------------------------	------

AMI 486 SX 137438953472 MB	CALL
----------------------------	------

AMI 486 SX 274877906944 MB	CALL
----------------------------	------

AMI 486 SX 549755813888 MB	CALL
----------------------------	------

AMI 486 SX 1099511627776 MB	CALL
-----------------------------	------

AMI 486 SX 2199023255552 MB	CALL
-----------------------------	------

AMI 486 SX 4398046511104 MB	CALL
-----------------------------	------

AMI 486 SX 8796093022208 MB	CALL
-----------------------------	------

AMI 486 SX 17592186044416 MB	CALL
------------------------------	------

AMI 486 SX 35184372088832 MB	CALL
------------------------------	------

AMI 486 SX 70368744177664 MB	CALL
------------------------------	------

AMI 486 SX 140737488355328 MB	CALL
-------------------------------	------

AMI 486 SX 281474976710656 MB	CALL
-------------------------------	------

AMI 486 SX 562949953421312 MB	CALL
-------------------------------	------

AMI 486 SX 1125899906842624 MB	CALL
--------------------------------	------

AMI 486 SX 2251799813685248 MB	CALL
--------------------------------	------

AMI 486 SX 4503599627370496 MB	CALL
--------------------------------	------

AMI 486 SX 9007199254740992 MB	CALL
--------------------------------	------

AMI 486 SX 18014398509481984 MB	CALL
---------------------------------	------

AMI 486 SX 36028797018963968 MB	CALL
---------------------------------	------

AMI 486 SX 72057594037927936 MB	CALL
---------------------------------	------

EXPANSION UNITS

CALL DRAM CO

"For the best DRAM products, prices & service!"

• Free Shipping (on orders over \$300.00)

• 100% Guaranteed

• 1 Year Warranty (on all products)

• Volume Discounts Available

• P.O.'s Welcome

• 2% Visa/MC surcharge

• C.O.D. Cash/Co. O.K.

• Prices subject to change

• Please call for current prices

GRAMS

1MEG X 1 100NS \$4.95

1MEG X 1 80NS \$5.15

1MEG X 1 70NS \$5.35

1MEG X 1 60NS \$5.55

256K X 4 80NS \$5.75

256K X 1 150NS \$1.05

256K X 1 120NS \$1.70

256K X 1 100NS \$1.80

256K X 1 80NS \$1.95

256K X 1 70NS \$2.29

256K X 1 60NS \$2.50

64K X 4 80NS \$2.75

64K X 1 120NS \$1.00

64K X 1 100NS \$1.75

(415) 398-2987

(800) 488-DRAM

FAX (415) 398-5402

P.O. Box 590127, San Francisco, CA 94159-0127

CIRCLE 574 ON READER SERVICE CARD

IBM Type SIMMS

4MEG X 9 80NS \$228.00

1MEG X 9 100NS \$48.00

1MEG X 9 80NS \$56.00

1MEG X 9 70NS \$53.00

1MEG X 9 60NS \$61.00

256K X 9 100NS \$16.00

What PC Magazine Classified is all about—

Big Circulation.

An astounding audience of 786,000+* brand specifiers, more PC product buyers than any other publication delivers. Virtually every PC Magazine subscriber has the expertise and authority to specify brands of personal computers for their companies.

Big Scope.

Advertising in PC Magazine Classified works in a big way. PC Magazine's enormous scope is one reason—but there are many other big reasons why advertising campaigns succeed in PC Magazine Classified.

PC Magazine Classified takes advertisers' volume sales message to the biggest audience, and supports that message in an editorial environment that encourages direct response buying.

Big Results.

PC Magazine Classified gets results. Advertising in PC Magazine Classified compels buyers to act, producing an average 16,462 inquiries per issue (an average 146 inquiries per advertiser per issue). Bottom line, PC Magazine Classified promotes active direct response spending, generating as much as \$200 million in sales revenue through the Classified section alone.

Want to start fully utilizing this gigantic marketing tool? Call your PC Magazine Classified Account Representative for more information or to place your ad, 212-503-5115 or 800-825-4237.

Source: Beta Research Study, 1988
*BPA Audit December, 1990

EXPANSION UNITS

ICs PROMPT DELIVERY!!!
SAME DAY SHIPPING (USUALLY)
QUANTITY DISCOUNTS AVAILABLE FOR BULK ORDERS

Memory for almost ALL computers

DYNAMIC RAM		
4M Board for hp Lins w/2MB		\$160.00
SIMM 4Mb	80 ns	230.00
SIMM 1Mb	80 ns	63.00
SIMM 1Mb	80 ns	54.00
4 Mbit	80 ns	28.00
4 Mbit	80 ns	34.00
1 Mbit	80 ns	5.75
41256	256Kx1	100 ns 2.10
41256	256Kx1	120 ns 1.95
44256	256Kx4	100 ns 5.95
4464	64Kx4	100 ns 1.95
EPROM		
27C4001	512Kx8	150 ns \$55.00
27C1000	128Kx8	150 ns 16.50
27C512	64Kx8	120 ns 7.50
27256	32Kx8	150 ns 5.00
27128	16Kx8	250 ns 3.40
STATIC RAM		
1 Mbit	128Kx8	100 ns \$15.00
62256LP	32Kx8	100 ns 6.50

OPEN 6 DAYS 7:00am-10:00pm SHIP VIA FED-EX ON SAT

FED-EX DEL ON SAT
FED-EX ORDERS RECEIVED BY
R-14 8:00 AM
R-14 8:00 AM
R-14 8:00 AM
R-14 8:00 AM

MAIL ROOM PROCESSING UNLIMITED INC.
4100 10th Ave.
OLYMPIA, WA 98513
(918) 267-4961

No minimum order
CDD AVAILABLE

CIRCLE 577 ON READER SERVICE CARD

MEMORY ICs !!!

4Mx9	80ns	\$220.00
PS2	2Meg simm	\$110.00
AST	1Meg simm	\$ 60.00
1Mx9	80ns	\$ 52.00
1Mx8	80ns	\$ 48.00
✓ 1Mx1	100ns	\$ 4.85
✓ 256x4	100ns	\$ 5.75
41256	120ns	\$ 1.85
41464	100ns	\$ 2.40
2800	80ns	\$ 2.75
4164	120ns	\$ 1.70

* Call for quantity discount, high-speed parts, SPP

80287-32	\$430.00	80287-16	\$275.00
80287-36	\$350.00	80287-12	\$185.00
80287-30	\$260.00	80287-10	\$160.00
80287-14	\$250.00	80287-8	\$145.00
80287-12	\$230.00		

8 V-308/10mb/s \$1.5/10

I.C. EXPRESS

15140 Valley Blvd. City of Industry, CA 91744

1-800-877-8188

FAX: (818) 369-1236 (Mon. Fri. 8-5 PST)

CALL FOR CURRENT PRICES & VOLUME DISCOUNTS

Customer service: (818) 333-8888 (Mon. Fri. 10-5 PST)

Price Shown for Cash. Money Card Visa add 3%
Prices are subject to change. Minimum order \$10.00
Shipping & handling. J&S Limited to \$5.00 or \$1.00 (1 lb)

CIRCLE 576 ON READER SERVICE CARD

PRINTERS

Hassle-Free Printer Sharing

SNAP Transmitter \$59
(includes 25 ft. cable)

SNAP Receiver \$69

Just attach a SNAP transmitter to the parallel port of each PC, a receiver to the printer, and connect with up to 1200 ft. of phone cable. As you add more PCs, simply plug in more transmitters. No software! No training!

call 800/ 445-6190
to order your SNAP or to
receive our **Free Catalog**
VISA-MC, AMEX are accepted

ASP Computer Products, Inc.
1026 W. Maude Ave. suite 305
Sunnyvale, CA 94086
FAX: 408-746-2803

CIRCLE 578 ON READER SERVICE CARD

Did you know...

On average, PC Magazine's direct market purchasers have spent—

- \$30,000 on hardware
- \$5,400 on software
- \$2,100 on accessories
- an average of \$2,855 per order

Get all the facts. Call your Account Representative for more information or to place your ad, 212-503-5115 or 800-825-4237.

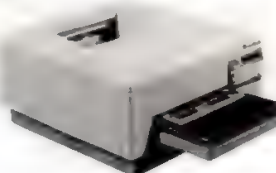
Source: Beta Research Study, 1988
*BPA Audit December, 1990

LaserJet Printer Enhancements

We guarantee* the lowest prices on

PACIFIC
DATA PRODUCTS

and other printer enhancements.



PACIFIC DATA CARTRIDGES

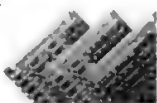
25 In One	Lowest Price
Pacific Data's best-seller. 172 Fonts and symbol sets. Now compatible with the LJ IIP/III. The best buy!	
Pacific Page: Excellent PostScript emulation. For Apple MAC too.	
Pacific Page for LJ II bundled w/2MB memory	Call
Pacific Page for LJII/III	\$359
Pacific MacPage™	Call
Pacific BarCode	\$365
Headlines in a Cartridge	\$209
Pacific Connect	\$309
Pacific Outlines I/II	\$219



PACIFIC DATA EXPANDABLE MEMORY BOARDS

User upgradeable by adding DIP memory chips

	LJII/III	LJII/LJIII
0MB	Call	Call
1MB	\$139	\$139
2MB	\$187	\$179
4MB	\$299	\$269



LP Memory™ for IBM 4019/4019E	Call
Pacific T Memory™	Call
for Epson EPL 6000, Toshiba Page L6, AT&T 593, MT905, Packard Bell 9500 and others	

SOFTWARE

Pacific Print™	\$295
Supports Pacific Data's emulation cart. on Novel LAN. Complete que control.	
PrintCache (LaserTorq)	\$99
Fastest print buffering product available	
Print A Plot 1.0/2.0	\$169/\$209
HPGL software emulation. Version 2.0 w/tiling capability	
LaserControl	\$129
Lets almost any software make full use of your laser printer	
MacPrint	\$129
Makes Macintosh 100% compatible with HP LJ printer	



HARDWARE & ACCESSORIES

LJII/III/Legal Tray	\$59
LJII/III Envelope Tray	\$72
LJ IIP Lower Letter Cassette	Call
BigBin	\$469

1,500 Sheets capability. Compatible with
all Canon SX Engine printers including HP LJIII

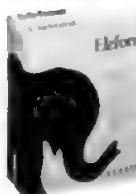
IQ ENGINEERING SUPER CARTRIDGES

SC1 55-Fonts, for all HP LJ Printers	\$259
SC2WP Tms Rmn/Helv. from 8 to 24 pts.	\$229
SC2-17 Typefaces w/fonts from 4 to 30 pts.	\$349
SC2XP Over 200 fonts from 4 to 30 pts.	\$489
SC2L Same as SC2 in landscape format	\$589
SC2LC Most wanted landscape fonts	\$229
SC2/LC Bundled SC2 and SC2LC	\$529
SC3 Scaling of typefaces for LJ III	CALL

ENHANCEMENTS FOR DESKJET PLUS & DESKJET 500 BY ELESYS

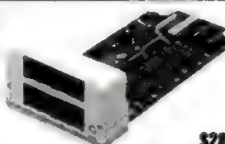
No need anymore for a dozen font cartridges. Two cartridges with
convenient access to high-quality fonts for third of the cost

Elefont Desk Cartridge	\$149
Four typefaces from 5 to 16 pt.	
Elefont Headline Cartridge	\$149
Three typefaces in 11, 15, 22, and 30 pt. incl. scientific symbols	
Desk + Headline (bundled)	\$199
Elememory Cartridge - 256K	\$139



PRINTER SHARING DEVICES

Family of plug-in sharing boards	
Model 80	\$369
Now at speed of 115K baud. 8 serial w/256K expandable to 512K/1.25M.	
Model 50	\$289
4 serial & 1 parallel. Same Mem. as Model 80. 115K baud.	
Model S4	\$149
4 serial automatic. Serial speed up to 115K baud	



ADOBE

Complete Adobe product line available.	
Adobe PostScript Cartridge	Lowest Price
New cartridge for LJ II	
Adobe Type Cartridge 1 & 2	\$239
Each with at least 25 Adobe PostScript typefaces	
Adobe Illustrator	\$278
Streamline Window	\$228
Adobe Type Library	Call

Entire library available for both MAC & PC

Adobe Type Manager Lowest Price

ATM software gives the professional
edge by taking the jagged edge off your
printed text and improving the text
displayed on your monitor

Publishing Pack	\$269
Collection of typefaces selected to work especially well together in particular applications. Three Packs to choose from; Newsletters, Forms and Schedules, and Presentations.	



Adobe Type Manager™ Plus Pak \$109

Complements ATM™ with 22 additional
PostScript™ language outline fonts
resident in most PostScript printers
from adobe.

Adobe Type Set 1/2	\$57
Adobe Type Set 3	\$117

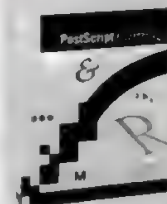
Adobe, PostScript and the PostScript logo are registered trademarks and, Adobe Type
Manager and ATM are trademarks of the Adobe Systems Incorporated, registered in
the U.S.A. ©1990 Adobe Systems Incorporated. All rights reserved.

MISCELLANEOUS CARTRIDGES

A wide variety of multiple fonts and special cartridges available.
Full font customization offered. Complete HP compatible font
cartridges in stock. From C01 to C08.

123/Spreadsheet Cartridge	\$149
Ideal cartridge for spreadsheets. Up to 30 characters per inch.	
Pro Collection Turbo Cartridge	\$179
65 Fonts 100% equivalent to HP's	
Tax & Finance (T)	\$129
For all tax preparation programs including Center Piece Software	
Fully compatible with A&T cartridge	

**FEATURED
SPECIAL!**



POSTSCRIPT CARTRIDGE FROM ADOBE®

Print on your
HP LJ II
complex graphics,
high-quality
text, using any
of the 35
PostScript™ language outline font programs
included, and enjoy unmatched software
and hardware compatibility.

Adobe Type Cartridges 1 and 2 are
ideal additions to the PostScript™ Cartridge.
Each has over 25 special collection
typefaces, ideal for special desktop
applications.

PostScript Cartridge from Adobe®	Lowest Price
Adobe Type Cartridge 1/2	\$219

ADOBE

*We Know
What
We Sell.*

DH
systems

1940 Cotner Ave.
Los Angeles, CA 90025
FAX: (213) 478-4770
Phone (213) 479-4477



VISA-MC
Accepted

NO CHARGE FOR CREDIT CARDS - IMMEDIATE
SHIPMENT ON APPROVED PURCHASE
ORDERS - 30 DAYS MONEY BACK GUARANTEE

—Except for opened software—Does not include return freight
or shipping & handling - All returned merchandise must be accompanied
by a return material authorization (RMA) number - Prices are subject to change
without notice - PhoenixPage is a registered trademark of Phoenix Technologies, Ltd. -
*Every reasonable competitive price will be met!

CIRCLE 579 ON READER SERVICE CARD

TAPE DRIVE SUBSYSTEMS



IF ALL 9-TRACK USERS WERE ALIKE, WE'D SELL ONLY ONE SUBSYSTEM.

Since they're not, Overland Data sells subsystems for all types of PC environments, tape formats and applications. So whether you're the occasional mailing list user or the day to day data cruncher, we have the tape drive, controller and software to fit your needs and budget. With the recent acquisition of Flagstaff Engineering's 9-track division, we offer a complete line of economical controllers in addition to our own high performance cards. And if you need to upgrade, we'll accept any manufacturer's controller card as a trade in for one of our cards.

Our 9-track users do enjoy some things in common: the longest warranties in the business, toll-free technical support, and the ODI Special Service Program. All this, to make using 9-track easy and productive. To find out more, call us. We'll pay for the call.

1-800-PC9-TRAK
(1-800-729-8725)

Bus Phone: 1-619-571-5555 • FAX: 1-619-571-4982

OVERLAND DATA
San Diego, CA

CIRCLE 160 ON READER SERVICE CARD

9 TRACK TAPE SYSTEM

FOR IBM PC/XT/AT
286/386/486



- Mainframe to PC Data Transfer
- High Speed Backup
- All Software, Complete System
- Service and Support, Easy Installation

call (818) 343-2700 or write to:
CONTECH Computer Corp.
P.O. Box 307, Tazewell, CA 91357

CONTECH

CIRCLE 581 ON READER SERVICE CARD

9-Track Tape Subsystem



Now you can exchange data files between your IBM PC/XT/AT and any mainframe or mini-computer using IBM compatible 1600 or 6250 BPI 9-Track tape. Unit can also be used for disk backup. Transfer rate is up to 4 megabytes per minute on PCs and compatibles. Subsystems include 7" or 10 1/2" streaming tape drive, tape coupler card, cables and software.

QUALSTAR

9621 Irondale Avenue
Chatsworth, CA 91311
Telephone: (818) 882-5822

CIRCLE 582 ON READER SERVICE CARD

TAPE SUBSYSTEMS

Your Choice 9 Track, 1/4 inch, 4 mm, 8 mm, 3480 compatible
PC/AT/386/486/PS/2, CLONES, SUN, MAC, MVAX
Call the tape subsystem experts • Our Advice is FREE
Tara Computer Products, Inc.
2219 E. Thousand Oaks Blvd. #102, Thousand Oaks, CA 91362
(800) 543-7403 (805) 496-0435 or (818) 706-9557
Fax# (818) 706-9556

CIRCLE 583 ON READER SERVICE CARD

SOFTWARE/ACCOUNTING

MIP Fund Accounting System

Simply the best software for non-profit & governmental organizations since 1982.

Flexible Chart of Accounts • Automatic Offset & Interfund Balancing • Automatic Cost Allocations • Monthly Budgeting & Forecasting • Check, P.O., & A/R Bill Printing • Multiple Funds • Multiple Overlapping Fiscal Years • User Defined Reports • IBM PC/XT/AT Compatible • Single User or Network • User Installable

Modules: General Ledger, Budget Reporting, Accounts Payable, Encumbrances, Accounts Receivable, Database Interface, Payroll, Fixed Assets

1-800-647-3863

505 East Hundland Drive, Suite 340, Austin, TX 78752

What do more than 1400 Government and Nonprofit Organizations Know?

When You Need Fund Accounting Software... You Need American Fundware.

American Fundware provides powerful software solutions - written specifically for the government and nonprofit sectors - that solve your fund accounting needs. Easy to Learn. Easy to Use. Easy to Produce Results.

FOR MORE INFORMATION CALL
AMERICAN FUNDWARE TODAY

1-800-551-4458 or Fax: 1-303-879-6850
P.O. Box 773028, Steamboat Springs, CO 80477
CIRCLE 584 ON READER SERVICE CARD

DBASE ACCOUNTING TOOLS

- *General Ledger
- *Invoice & A/R
- *Service Billing
- *Job Costing
- *Purch Ord/Inventory
- *Bill of Materials
- *Accounts Payable
- *Sales Analysis
- *Order Entry
- *Job Estimating
- *Payroll
- *Lazr-Forms

\$99 ea + s/h w/dBASE 3+ or 4 Source Code
DATAMAR SYSTEMS
8586 Miramar Place
San Diego, CA 92121
(619) 452-0044 MC, Visa, AX, CH, COD

COMMUNICATIONS

MULTI-LINE PC-DOS DBS

The Bread Board System (TBS). Secure reliable, full-featured commercial information system for IBM and compatibles. Menu editor allows customization by nonprogrammers. Kermit, X & Y-Modem. High performance allows up to 32 simultaneous callers. Up to 38,400bps. dBASE module available.

eSoft, Inc.
15200 E. Girard Ave. #2550
Aurora, CO 80014
(303) 699-6565

DATA ENTRY

DATA ENTRY SOFTWARE

HEADS-DOWN data entry and TWO-PASS verification. Fast and powerful, of course, but more importantly, extremely easy to use. Paint the screen formatting in minutes. On-line help text, edit language, batch control.

PC from \$395
Also for LAN's,
IBM AS/400™,
IBM S/36

FREE trial
206/776-6443
800/356-0203

COMPUTER KEYES
21929 Makah Rd.
Woodway, WA 98020

Replace dedicated data input systems.
Front end mainframe applications.

KeyEntry III

- ☐ LAN or stand-alone environments
- ☐ ScreenPainter and MenuManager included
- ☐ Batch Control System and Reformat utility
- ☐ Spanish, German, and French versions
- ☐ Outstanding customer support
- ☐ Thousands of users worldwide
- ☐ OS/2 version

800-533-6879

SCS
SOUTHERN COMPUTER SYSTEMS, INC.
800 333-5888 • FAX (800) 333-5888
In Oregon: 503-588-1000 • 970-588-1000 • FAX 970-588-1000

To place your ad in
PC MAGAZINE Classified
Call (212) 503-5115
or (800) 825-4ADS

Calling about an ad?
Say you saw it in

PC Magazine Classified

DATA ENTRY

DATA ENTRY

Why have over 85% of the largest companies in the U.S. selected the RODE/PC Data Entry System?



The answer will be obvious when you call for information and a free demonstration today.
(415) 323-8195

DPX • 490 California Avenue
Palo Alto, CA 94306

CIRCLE 585 ON READER SERVICE CARD

VIKING DATA ENTRY

Professional Quality Software

- Used by U.S. Census
- Advanced validation
- Sequential/SAM files
- MS/DOS, UNIX, XENIX, VMS, AIX
- Technical support
- Re-key verify

Viking Software Services
4808 E. 67th St., Ste. 100
Tulsa, OK 74136
918/491-6144 FAX: 918/494-2701

DESKTOP PUBLISHING

- Scanned Images Database
- 1 Million+ Documents
- Laser Printer Output
- dBase Comp. / Multiple Indices
- Super FAST Software Compression
- CGA / HERC / EGA / VGA / EVGA
- LAN Version \$795
- Accepting Dealers

214-235-4008

CIRCLE 586 ON READER SERVICE CARD

WordProofer

Replace proofreading or document comparators with the faster, more accurate technique of two-pass proofing. Easier to learn and use than any word processor or desktop publishing program. Key, edit, or proof any file on your PC, then import to your application.

Single copy \$295
Multicopy discounts
Network version
Free tech support



COMPUTER KEYES 206/776-6443
21929 Makah Rd.
Woodway, WA 98020 800/356-0203

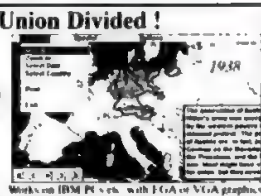
EDUCATION

Germany United! Soviet Union Divided!

Now... **Millennium**
puts today's headlines in perspective. Sit back and watch the evolving map of Europe as history flows across your PC's screen in dramatic colors. Or zoom in on any country in any year during the past 1,000 years to find out exactly what's going on.

"Now includes the Middle East!"
Clockwork Software (312) 327-6012
P.O. Box 148036, Chicago, IL 60614 USA

\$79



CIRCLE 587 ON READER SERVICE CARD

B.S. & M.S. In Computer Science

- ALL COURSES BY CORRESPONDENCE

- Increase your earning power
- Join students from leading computer companies
- Most courses fully interactive

AMERICAN
INSTITUTE
COMPUTER
SCIENCES

For free
information call:
1-800-767-AICS

ENTERTAINMENT/GAMES



SeXXy Software

Must State
Age Over 21

- SeXXy Disk #1** An unbelievable visual erotic encounter — MUST SEE!
- SeXXy Disk #2** — NEW! 3 Erotic encounter games for friends and lovers guaranteed to shed both clothes and inhibitions
- SeXXy Disk #3** An anatomical arcade game with unusual ammunition
- SeXXy Disk #4** — 2 more incredible visual erotic encounters — impress your friends
- SeXXy Disk #5** Create your own erotic fantasies about friends and lovers
- SeXXy Disk #6** — NEW! View, print, or edit ten sizzling pictures including celebrities

\$7 each, any 3 for \$17, or all 6 for \$32.
for IBM & compat. CGA, EGA or VGA graphics req'd

ADD \$3 S/H • 3.5" OR FOREIGN ORDERS ADD \$2 PER DISK • IN PA ADD TAX
VISA/MC Orders only 800-243-1515 Ext. 600XX
24 HRS./7 DAYS • Or check/MO to SeXXy Software 2880 Bergey Rd. Dept. 600XX, Hatfield, PA 19440
THE BEST IN ADULT SOFTWARE FOR LESS!!
SADDAM HUSSEIN TARGET GAME — Only \$15.00
Shoot Patriot Missiles at Actual Pictures of him as he yells at you! TRUE SOUND — As seen on TV News
CGA & VGA included. Shipped FREE to Desert Storm Military!

CIRCLE 588 ON READER SERVICE CARD

PaperLess Filer™ 2.1

PaperLess Corporation
1750 N. Collins #200
Richardson, TX 75080

\$495

To place your ad in

**PC MAGAZINE
Classified**

Call (212) 503-5115
or (800) 825-4ADS

Asian Goeds VGA Centerfolds

Beautiful Exotic (Oriental) girls on your PC Screens! Highest quality 256-color VGA pictures. Satisfaction guaranteed. We pay for shipping! No Copy/hold!
Complimentary preview with every order. Requires VGA with 640K memory
Answer: Lovely Filipina/Chinese girl. Soft and slender.

Size #181
Amy: Japanese American Princess. Just as sweet but twice as naughty.
Size #201

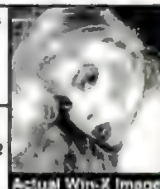
Specify 1 512KSHD or 2 3.5DSD \$14.95 per set. CA residents add 6.5%
Must state age over 21. Send check or Money Order to:
T.M.G. 13821 Wilshire Blvd., Suite 839, Los Angeles, CA 90025

CIRCLE 589 ON READER SERVICE CARD

#601	16 color \$14.88	256 color \$19.88	Add \$1 for each 3.5" disks
#602	16 color \$14.88	256 color \$19.88	Please include \$3 S&H
#603	16 color \$14.88	256 color \$19.88	FL add 6"
#105	Includes all three disks (601, 602 & 603)		
	16 color \$37.88	256 color \$49.88	407-479-0588

WINDOWS 3.0 VIEWER INCLUDED
READY TO USE BACKGROUNDS
Standard Windows VGA uses 16 Colors
some SVGA drivers use 256

Send check or money order to:
STARWARE PUBLISHING CORP
P.O. Box 340203 - Dept. 22
BOCA RATON, FL 33434
Must state age over 21



CIRCLE 590 ON READER SERVICE CARD

Did you know...

On average, PCMagazine's direct market purchasers have spent
• \$30,000 on hardware
• \$5,400 on software
• \$2,100 on accessories
• an average of \$2,855 per order

PC Magazine is exclusively read by over 763,398* business buyers and brand specifiers, including 90,000 computer resellers and consultants

83% of PC Magazine's subscribers have purchased or authorized the purchase of PC products from direct marketers in the last 12 months.

Get all the facts
Call your Account Representative for more information or to place your ad. 212-503-5115 or 800-825-4237

Source: Beta Research Study, 1988
*BPA Audit June, 1990

PC CLASSIFIED

FINANCIAL

PRO planner

Planning for business success has never been easier! Now, in one convenient package, you'll find all the tools you need!

Here's a sampling:

- Financial statements
- Ratio and break-even analysis
- Amortization & loan schedules
- Cash flow analysis
- Competitor analysis
- Business valuations
- Market share/sales forecasts
- Staffing planner
- Inventory analysis
- Project planner

Over 35 spreadsheets in all! Includes graphs, help, pop-up utilities, sideways printing, import/export WK1/ASCII, etc.

PLUS a complete manual—Business Planning for Growing Companies. It takes you step-by-step through every aspect of planning for your company's success.

Only \$129 (+\$5.50 S&H) with our "no questions guarantee." VISA/MasterCard accepted.

Order Toll Free 1-800-767-6884

American ComVision, Inc.
9974 Scripps Ranch Blvd, Ste. 21
San Diego, CA 92131

CIRCLE 591 ON READER SERVICE CARD

LOAN PLUS®

Money collection problems? Automate loan processing from loan date to payoff. Computes interest, principal & balance for each payment. Interest options: monthly, daily, rule of 78, etc. Reports: loan collection, amortization, receipts, invoices, late notices, year end, etc. \$695 \$295 Free demo \$5 s/h.

ADVANCED PERFORMANCE, Inc.
107 Court St., Pickens, S.C. 29671
803-878-2100/Fax 803-855-4639
To download demo BBS 201-473-1991

Investment Charting

PC METASTOCK
PROFESSIONAL
\$349
Demo Disk—\$5

Version 2.0 has 100+ new enhancements! Perform sophisticated technical analysis on stocks, bonds, futures, mutual funds, etc. Features multiple windows, 45+ pre-programmed indicators, powerful formula builder, profit tester, unattended operation, plus much more! Compatible with 20 data services. For complete literature, call toll-free:

1-800-882-3040

EQUIS International, Inc.
Box 26743 S.L.C. UT 84126 (801) 974-5115

CIRCLE 592 ON READER SERVICE CARD

FOREIGN LANGUAGES

Diplomat Software, Inc.
Alphabets Of The World For Your PC
For Make Alphabets
DIP-129



Series of 36 alphabets providing both English and foreign characters for screen, keyboard and printer support while using existing software. WordPerfect, Word, WordStar, Quattro Pro, Ventura Publisher, Works, dBase... more.

Diplomat Software, Inc.
3700 Campus Drive, Suite 202 Newport Beach, CA 92660
Phone (714) 474-0808 Fax (714) 250-8117

Starters Package \$125
Ventura Support \$95
PageMaker Support \$95
PerfectWord Support \$95
LaserWriter \$75

Subtotal is sold only with purchase of Starter package or Support Starter package and Support sold per language \$5.50 per package VISA, MC, check C.O.D. (U.S. only add \$8) CA residents add 6.75% tax

CIRCLE 593 ON READER SERVICE CARD

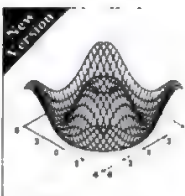
UPS SHIPPING SOFTWARE

Can capture shipping information directly from your invoicing screen or transfer via batch file. Computes Zone, Rate and Charges. Prints UPS Manifest, COD Tags, Shipping Labels, etc. Flexible and very easy to use. Only \$149. Multi-User \$295

V-TECHNOLOGIES
P.O. BOX 4321
WATERBURY, CT 06704
(203) 879-6960

Calling about an ad?
Say you saw it in
**PC Magazine
Classified**

GRAPHICS



CoPlot

Scientific Graphics Software

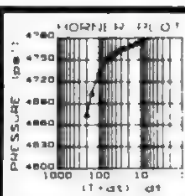
Quality results. Just \$159.

John Dvorak says it is "Genuinely Interesting Software"

CoHort Software (415) 524-9878
P.O. Box 1149, Berkeley, CA 94701
(This ad was created with CoPlot.)

CIRCLE 594 ON READER SERVICE CARD

New features: work with up to 16 graphs at once, use two Y axes, new kinds of axes, new spreadsheet features, new and better fonts, new screen/printer/graphics file drivers, key-stroke macros, portrait and landscape printing, EMS memory and RAM disk support, and much more.



INGRAF

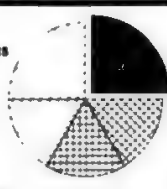
VIDEO, PRINTER & PLOTTER Graphics Library. NO ROYALTIES. SOURCE CODE.

C, FORTRAN, PASCAL & BASIC versions.

Sutrasoft

10506 Permian Dr.
Sugar Land, TX 77478
(713) 491-2088

CIRCLE 595 ON READER SERVICE CARD



HEALTH

Fit Healthier—Get FIT!!



The FOOD PROCESSOR II

Top-Rated software has best data available for 2400 foods, 30 nutrients. Plan diets, menus, recipes; shows nutrient excess, deficiency, ratios, graphs.

Used by thousands: USDA, fitness colleges, hospitals, & home-users

Send Now: FREE Demo Disk !!

ESHA RESEARCH
PO Box 13028-M
Salem, OR 97309
Ph: (503) 585-6242

CIRCLE 596 ON READER SERVICE CARD

MANUFACTURING

THE COMPLETE BUSINESS SOFTWARE PACKAGE

INVENTORY BILLS OF MATERIALS
ACCOUNTING INVOICING
SALES pc/MRP PURCHASING
ADDRESS BOOK RECEIVING
UTILITIES STOCK ROOM

FREE LITERATURE
WORKING DEMO \$36
SM SINGLE USER \$178
LG SINGLE USER \$385
LG MULTI USER \$595

SOFTWARE ARTS
P.O. BOX 3621
SANTA CLARA, CA 95061
(408) 248-8445

CIRCLE 597 ON READER SERVICE CARD

MUSIC

Recording Studio in a PC? Piece of Cake.

Cakewalk, the 256-track MIDI sequencer, lets you record, edit, and play back music using a MIDI-compatible instrument. Designed for both musicians and PC hobbyists alike. It's a PC Magazine Editor's Choice! The #1-selling MIDI sequencer for the IBM PC. Only \$150.

**Twelve
Tone**

Get a Piece.

Call 800-234-1171 and ask for our free catalog.
Full line of MIDI software and interfaces available.



Cakewalk 4.0

P.O. Box 768, Watertown, MA 02272 (617) 273-4437

CIRCLE 598 ON READER SERVICE CARD

Calling about an ad? Say you saw it in
PC Magazine Classified

MUSIC

SONGWRIT V MUSIC PROCESSOR

Prints professional sheet music, songs, scores with text, chords, dynamics. Compose, edit, record, play, transpose, copy, extract, import, publish - all in standard notation. Symbol editor/librarian. PC, MIDI or SMF entry & playback. Matrix/laser printers. \$99.95 + \$5 s/h. Free sample output
SONGWRIT SOFTWARE
7 Loudoun Street, S.E., Suite 5A
Leesburg, VA 22075
1 (800) 877-8070

PREVENTIVE MAINTENANCE

PM Tracking System

A system for managing the preventative maintenance process using schedules, work orders, and reports. Features: totally menu driven, dBASE-3 plus file format, context sensitive HELP online, user definable codes, all codes & data validated during data entry, built in backup/restore of databases, history reports. TrackerSoft, Dept. 101
P.O. Box 3006
Fairview Heights, IL 62208-3006
618-398-4252

MAINTENANCE & INSPECTION

An easy-to-use computerized method to organize, operate, and control an effective preventive maintenance system. Applicable to any type of business or industry. Full screen input and displays, plus function key help command. Maintains historical data, creates work orders, and provides numerous reports. For info, write to:
PENGUIN COMPUTER CONSULTANTS
P.O. Box 20485
San Jose, CA 95160
(408) 997-7703 FAX: 408-927-0570

PROGRAMMERS TOOLS

FORTTRAN

Features • Speed • Tools

LP77 — Full ANSI 77, Debugger, Editor for only \$99

F77L — The experts' choice for DOS 640K compilers

F77L-EM/32 — 32-bit compiler that breaks the 640K barrier

Lahey Computer Systems
P.O. Box 6091

Incline Village, NV 89450
Tel: 702 831-2500 Fax: 702 831-8123

800 548-4778

PUBLIC DOMAIN/SHAREWARE

FREE - 15 DISKS FULL OF SOFTWARE
TRY US! Get 15/5-25" or 6/3-5" disks full of our bestselling NO VIRUS software for IBM compatibles. Desktop Publishing, Business and Education, Utilities, Games, Finance and Clip Art.
PAY ONLY \$5.00 SHIPPING/HANDLING
SATISFACTION GUARANTEED - CREDIT CARD ONLY
SMC SOFTWARE PUBLISHERS
619 931-8111
CIRCLE 599 ON READER SERVICE CARD



Public
(software)
Library

The best organized, most comprehensive, most up-to-date... - PC Today
...Extravagant service... - Whole Earth Review

Call for a free newsletter:
800-242-PSL 713-524-6394
Member - ASP

CIRCLE 600 ON READER SERVICE CARD

MORE BYTES FOR THE \$\$\$

HUNDREDS of NEW Shareware/PD programs in our NEW FREE Spring '91 catalog!! Get only the BEST for your money. We have one of the largest QUALITY libraries in the country. Our 70+ page detailed catalog gives specific info on each program. Call Toll Free! MC/VISA
BIG BYTE SOFTWARE
P.O. Box 14008
ARLINGTON, TX 76094-1008
1-800-879-BYTE (24 hrs.)

REAL ESTATE

PROPERTY MANAGEMENT

Rental-Ease. New state of the art property management software. Extremely fast and easy to use. Everything is included, tenant tracking, repairs and maintenance, income and expense, check writing. No extra modules to buy. The ultimate in property management. \$695 complete. Free brochure, Demo \$10.
STRATEGIC OFFICE SYSTEMS
688 North 500 West #61
Mt Pleasant, UT 84647
800-942-6784 or 801-462-2130

Calling about an ad?
Say you saw it in

**PC Magazine
Classified**

SCIENTIFIC

GREAT GEOLOGICAL SOFTWARE!

Over 60 programs for petroleum, mining, hydrology, academic and scientific uses. Gridding/contouring, log plotting, plate tectonics, digitizing, basemapping, ternary plots, stereonet, cross sections, lots more. LaserJet support, Macintosh too! Affordable, \$75 to \$2500. Call, write or fax for free catalog.
Rockware Inc.
4251 Kipling Street Suite 595
Wheat Ridge, CO 80033
303-423-5645 FAX: 303-423-6171

SECURITY



**SOFTWARE
OR
HARDWARE
TO PROTECT
YOUR
\$\$ PROFITS \$\$**

Since 1986, thousands of companies worldwide have chosen Az-Tech Software as partners in their fight against Software Pirates. Why? Because Az-Tech has offered them,

EVERLOCK SOFTWARE COPY PROTECTION
EVERTRAK SOFTWARE SECURITY
EVERKEY HARDWARE PROTECTION

The ALL IN ONE device that offers
• REMOTE RESETS
• SERIALIZATION
• DATE EXECUTE LIMITS
• COMPRESSION
and much, much more



These products are easy to use and most important, they work! No one in the market place can offer you the Flexibility, Ease of Operation, or Degree of Protection that You receive with Az-Tech products.

Call Today for a FREE Demo
800-227-0644



Az-Tech Software, Inc.
Security Products That Work

305 East Franklin • Richmond, MO 64085
(816) 776-2700 • FAX (816) 776-8398

CIRCLE 753 ON READER SERVICE CARD

SOFTSHOPPE, INC.
ASP Member

■ Selected Programs
■ Latest Versions
■ As Low as \$1.50

FREE CATALOG
IBM PD/SHAREWARE
POB 3678, Ann Arbor, MI 48106

Call 800-829-BEST (2378)
or 313-761-7638
Fax 313-761-7639

CIRCLE 751 ON READER SERVICE CARD

RELIGION

Save \$89.95

BibleSource™
NIV-NIV Study Notes-KJV

New modular BibleSource software offers NIV Bible Study Notes and NIV text for the first time. Use with KJV on the same screen. Add your own notes and tailor your study to specific interests.

Limited time offer: Buy NIV module and get NIV Study Notes module free (regularly \$89.95). Offer expires July 31, 1991. Available at Christian bookstores everywhere. Zondervan, Dept 0591PCM.

1-800-727-7759

CIRCLE 752 ON READER SERVICE CARD

CHURCH SOFTWARE

Discover for yourself why more churches are choosing **PowerChurch Plus™**. Try out the leading membership and accounting package. Call today for your FREE full-working DEMO.

F1 SOFTWARE, 6300 Varrel Avenue, Suite H, Woodland Hills, CA 91367
(818) 888-1800

CIRCLE 754 ON READER SERVICE CARD

SECURITY

STOP SOFTWARE PIRACY

With our Copy Protection Products. They really work and do not burden the honest user...

For Hardware Based Security (Parallel Port Interface)

- **STANDARD KEY**
Unlimited executions
- **COUPON KEY**
Limited executions
- **READ/WRITE KEY**
Field programmable memory
- **DURATION KEY TAG**
On-chip clock for leases



For Disk Security
High Level Security

With hard disk install/uninstall included

- **PADLOCK II DISK**
- **COUPON DISKS**

Low Level Security
User Installable Protection

- **PC-PADLOCK**

The market is filled with copy protection products which burden the user or simply don't work. We have over 3500 satisfied software firms utilizing our systems. The high-level fingerprint has not required an update in over 3 years.

Call or write for more information.

GLENCO ENGINEERING INC.
SERVING THE SOFTWARE INDUSTRY SINCE 1979
800-562-2543

270 Lexington Dr (708) 808-0300
Buffalo Grove, IL 60089-6930 FAX 808-0313
CIRCLE 755 ON READER SERVICE CARD

BIT-LOCK® SECURITY

Piracy SURVIVAL 8 YEARS proves effectiveness of powerful multilayered security. Rapid decryption algorithm. Device transparent to PARALLEL or SERIAL port. Complemented by low cost KEY-LOCK™ multifunctional COMPU-LOCK™ Countdown, timeout, data encoding, multi-product protection, DOS/UNIX. Access control MICROCOMPUTER APPLICATIONS
3167 E. Otero Circle
Littleton, CO 80122
(303) 770-1917

SURVEYS

THE SURVEY SYSTEM

An easy to use menu driven system for the entry, editing, processing and presentation of questionnaire data. The system can produce camera ready cross-tabs and other tables in banner format. Also statistics and graphics. Regression and open-end coding/analysis options available. CREATIVE RESEARCH SYSTEMS
15 Lone Oak Ctr., Dept. P
Petaluma, CA 94952
(707) 765-1001

WINDOWS

Custom Windows Programming

- Experienced
- Quick Results
- Large Staff

McClure Consultants Ltd.
Barrington, Illinois 708-382-6233

CIRCLE 756 ON READER SERVICE CARD

MISCELLANEOUS/ ACCESSORIES

COMPUCOVER® COVER YOUR INVESTMENT



Keyskin™ Keyboard Protectors

Clear to the eye and soft to the touch, you just type right through them. KeySkin™ Keyboard Protectors stay on 24 hours a day, protecting against spills and dust, even while you use your computer. Easy to put on and last for years. Hundreds of models available. **\$25.95**

Dealer Inquiries Invited

USA (800) 874-6391 Fax (904) 863-2200
FLA (800) 342-8008 (904) 862-4448

2104 Lewis Turner Blvd. (Dept. PCM)
Fort Walton Beach, FL 32548 MC

CIRCLE 757 ON READER SERVICE CARD

ACCESSORIES

DUST COVERS **ComputerWear**
100% COTTON CANVAS
Breathable! Static-Free! Beige with Grey Trim
For Computers, Keyboards, Printers & Lasers
All Popular Models. Superior Quality. Best Price
NEW! ViziFlex-Seals
SKINS for Keyboards

1-(800) 826-5761
Contemporary ComputerWear
1320-36th Ave San Francisco CA 94122
CIRCLE 758 ON READER SERVICE CARD

BAR CODING

BAR CODING

BAR CODE READERS

Keyboard Wedges for
IBM PC/XT/AT, PS/2 models,
All Macintosh models,
IBM, DEC, MEMOREX/TELEX,
and Wang terminals.

Direct from manufacturer
Reseller inquiries welcome

BARXON ELECTRO-OPTICS, INC.

2222 GALLOWAY RD., SUITE 140

DUNN LORRAINE, VA 22027

1-800-220-5121

CIRCLE 759 ON READER SERVICE CARD

TKS Builds a Better Bar Code Reader!

EZBarcode PC-WEDGE II

- Free bar code printing utility included
- Complete with wand, it's

only \$289!

RS-232 version \$319
Macintosh version \$399
Stainless steel wand add \$60
Mag stripe option add \$100

Portable Hand held Data Collection Terminals

Easy-to-use application generated software included free

- PHT-34: Alphanumeric keypad, bar code wand, 128K memory... \$1095
- PHT-60: Graphics touch-sensor LCD display, programmable function keys, bar code wand, RAM card port, 256K memory... \$1795

Bar Code Printing Programs... \$149 each

- Print Code 39, U.P.C., EAN, 2 of 5 on dot matrix or Laser Jet printers
- EZBarcode II - Keyboard or text file input, incrementing, on-line help
- dBARCODE - Prints bar codes from within dBASE
- EZRes - Memory resident bar code printing program

TimeKeeping Systems, Inc.

1306-C East 55th Street • Cleveland, Ohio 44103 • Phone: (216) 361-9995 • Fax: (216) 361-0030

BAR CODE READERS AMERICAN MICROSYSTEMS

2190 A Regal Pkwy • Euless, Texas 76040 • (817) 571-9015
FOR PC, XT, AT, PS/2 & TERMINALS:

- No software changes required
- Data appears as keyboard input
- Reads Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey
- Auto-discriminates between codes
- Accepts WAND, SLOT, CCD, LASER, MAG STRIPE



BAR CODE PRINTING SOFTWARE:

- For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers
- Prints Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey
- Easy to use

(800) 648-4452 • FAX: (817) 685-6232
30 Day Money Back Guarantee
One Year Warranty

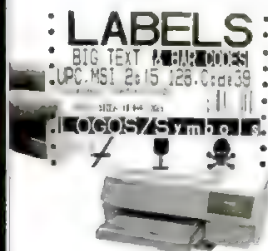
To place your ad in
PC MAGAZINE Classified

Call (212) 503-5115 or (800) 825-4AD8

BAR CODING

BAR CODE HEADQUARTERS

LABELING SOFTWARE



- For Epson, Oki, IBM, Dot Matrix and HP LaserJet Printers.
- Any Format. Any size. Totally flexible design. Many formats furnished.
- One Screen Label Design, WYSIWYG or text. Context sensitive help.
- 16 text sizes — from .1" to 3" (reads at 100").
- 13 Bar codes: 2of5, 128, UPC/EAN, MIL-STD, AIAG, ZIP, & Code 39.
- Auto-incrementing. Simple operator interface. File input.
- Reversals, color, soft fonts. Prints PCX files for logos, symbols, etc.
- Powerful, Versatile, Easy, Fast! (drives LaserJet at 8ppm).
- Scalable fonts any size to 13" on LaserJet III.
- Label shown printed with LabelRIGHT™ — \$279
(Other DOS bar code programs from \$129. SCO/UNIX — \$199).

PORTABLE READERS

- Battery operated reader. Wand or laser input.
- Simple, powerful, 64K memory. Built in real-time clock.
- Bar code or keyed input. Easy raised rubber keyboard.
- Reads Codabar, MSI, 2of5, UPC/EAN, 128, Code 39.
- Easily programmable prompts. Uploads via RS-232 or keyboard.
- Doubles as non-portable reader (on-line wedge operation).
- Complete with stainless steel wand — \$849



BAR CODE READERS

- For PC, XT, AT, PS/2, Mac and all RS-232Terminals
- Attaches as 2nd keyboard. No software changes needed.
- Reads 2of5, Codabar, UPC/EAN, 128, MSI, Code 39.
- 1 or 2 input scanners: wand, slot badge, magstripe, or laser.
- Top rated by independent review!
- Complete with steel wand — \$399.

Direct from manufacturer
30 day \$ back guarantee!
Company P.O.'s accepted
2 year warranty on wand & reader



WORTHINGTON

DATA SOLUTIONS
417 Ingalls Street • Santa Cruz, CA 95060

FAX 408-458-9964
408-458-9938

800-345-4220

PC WAND BAR CODE READERS MORE FEATURES MORE AFFORDABLE



NEW IMPROVED
Starting at \$279 with wand! • Transparent operation. • No software required • PC, XT, AT, Mac, PS2, others. Look into our full line of reliable, competitively priced readers, keyboard and serial wedges, portable data collectors, multi-drop readers, wands, laser scanners, mag stripe readers, and bar code printing software • OEM and reseller discounts. We provide solutions to systems! Custom application software for Data Collections available. Call for details.

INTERNATIONAL TECHNOLOGIES & SYSTEMS CORP.

655-K North Berry St., Brea, CA 92621
(714) 990-1080 • FAX (714) 990-2503
13 Welwyn Ct., Richmond, VA 23229
(804) 741-6725
CIRCLE 760 ON READER SERVICE CARD

PC Magazine Classified

is #1 in classified ad
lineage in IBM-Standard
computer publishing.
Join the winning team
and place your ad.

Call (212) 503-5115
or (800) 825-4AD8

POWER TOOL

PERCON Series 10 bar code
and magnetic stripe readers.
Excellent first-try read rate.
5 yr. warranty on decoder
(1 yr. on input devices).
Ask about our portables, too!

Call 1-800-873-7266

1710 Willow Creek Circle Ste. 37 • Eugene, OR 97402
(503) 344-1189 • FAX (503) 344-1399

PERCON
INCORPORATED

Powerful Technology. Service You Can Count On.



CIRCLE 762 ON READER SERVICE CARD



BAR CODE & MAGNETIC STRIPE READERS For PC/XT/AT, PS/2, and RS-232 Interface

- Direct keyboard interface, no software change
- Reads UPC, EAN, Code 39, 11, 128, 125, Codebar, MSI
- Direct from manufacturer, 30 day money back guarantee
- Reader with steel wand - \$379
- with Magnetic Stripe Scanner - \$299
- Resales discount available

SCANTECH

12981 Ramona Blvd Unit 1 Tel (818) 960-2999
Inwoodale, CA 91706-3797 Fax (818) 962-4819
CIRCLE 761 ON READER SERVICE CARD

To place your ad in
PC MAGAZINE Classified

Call (212) 503-5115 or (800) 825-4AD8

BOOKS/CATALOGUES/ PUBLICATIONS

PCjr Owners!!

Everything You'll Ever Need Plus Much, Much More!

- Memory Sockets - Expand now to 1.2 MB!
- Second & Third Disk Drives which Snap-on-Top
- 3 1/2" 720K Disk Drives for PS/2 Compatibility
- Speed-Up Boards-Increase Speed to 9.54 MHz
- 20, 30, 40, 60 & 80MB Hard Disk Drive Systems
- 101-Key Enhanced PCjr Keyboards
- Serial Port Compatibility Boards
- Modifications for Tandy Compatibility
- PCjr Compatible Software & Game Cartridges
- PCjr System Units with 128K or 256K
- Diagnostic Service Only \$25
- Replacement Parts and Repair Service

Remember—When you purchase all your PCjr products from PC Enterprises you'll never need to worry about compatibility. Our new full color catalog now features over 300 PCjr products on 58 pages. Call or write for your FREE copy today!

(800) 922-PCjr (201) 280-0025

PC ENTERPRISES

"The Jr Products Group"

PO Box 292 Belmar, NJ 07719

"Dedicated to the Support of the PCjr Since 1984"

CIRCLE 763 ON READER SERVICE CARD

DATA CONVERSION

CHANGING WORD PROCESSORS?

Media transfer to or from:
IBM, XEROX, DEC, WANG, EXXON, MACS,
LANIER, CPT, CT, MICOM, NBI, WRDPLX,
WORDSTAR, WORDPERFECT, MS/WRD, DW4,
MULTIMATE, SAMNA, MASII, DCA
*****FREE TEST VERSION*****
Conversion Specialists
531 Main St., Suite 835
El Segundo, CA 92045
(213) 545-6551
(800) 825-0540

DISK/TAPE/OPTICAL SCANNING

- 33¢ per page typewritten text to disk in ASCII, 50¢ per page all WP formats.
- Scan Typeset text 6 to 24pt low rates
- Disk convert from IBM, WANG, XEROX, VYDEC + 1000 others customized.
- Tape conversions (800, 1600, 3200, 6250 BPI)
- BEST RATES • FREE TEST
- 1st RUN COMPUTER SERVICES
1261 Broadway Suite 508
New York, NY 10001
(212) 779-0800 (800) 833-2207

TOTAL SERVICE CONVERSIONS

- OUR NAME SAYS IT ALL •
- Quality Service •
- Quick Turnaround •
- Low Prices •
- 1-800-5-CONVRT (526-6878) •
- In CA 1-213-669-8134 •
- Word Perfect Training Available •
- TOTAL SERVICE CONVERSIONS, INC.
1933 North Monon Street
Los Angeles, CA 90027

DATA RECOVERY SERVICES

ONTRACK DATA RECOVERY

The Data Recovery Professionals

Ontrack Data Recovery specializes in recapturing data from any microcomputer hard drive or floppy diskette.

• 95% Success Rate • Fast Turn Around

Priority service available • Expertise with Novell, DOS, Macintosh, OS/2, Unix, Xenix, Bernoulli, Sun and more!

Find out why we are the leaders in data recovery - call an Ontrack Data Recovery representative today for more information.

1-800-872-2599

International: 612-937-5161 • FAX: 612-937-5750

CIRCLE 764 ON READER SERVICE CARD

DISK CONVERSION

TAPE/DISK CONVERSIONS

Conversion services to or from
over 2000 computer systems:
• Magtapes • Mini Computers
• Micro Computers • Typesetters
• Word Processors

CALL THE INDUSTRY LEADERS

PIVAR
COMPUTING SERVICES, Inc.

800 - CONVERT

708-459-6010

165 Arlington Heights Rd #M
Buffalo Grove, IL 60089

DISKETTE COPY SERVICES

*Software
Production*

- Disk duplication
- EVERLOCK copy protection
- Label/sleeve printing
- All formats • Warehousing
- Full packaging services
- Fulfillment • Drop shipping
- 48-hour delivery
- Consultation & guidance

Star-Byte, Inc.

2880 Bergey Rd Hatfield PA 19440

800-243-1515

CIRCLE 765 ON READER SERVICE CARD

DISKETTE COPY SERVICES

Diskette Duplicator

240 Copies Per Hour
Using Any IBM PC/XT/AT
or Compatible.

\$1,995



Desktop Autoloaders also
available, for unattended use.
For information, or to order,
call 415-651-5580.

Datapath

CIRCLE 766 ON READER SERVICE CARD

SOFTWARE DUPLICATION

- One-Stop Shopping
- Diskettes & Tapes
- Document Printing
- Custom Printing
- Custom Packaging
- Fulfillment
- Fast Turnaround



MEGAsoft

P.O. Box 710, Freehold, NJ 07728

800-222-0490

In NJ 908-462-7628

FAX 908-462-5658

CIRCLE 766 ON READER SERVICE CARD

SOFTWARE

Quotify Duplication of Affordable
Pricing • Custom Labeling &
Packaging • Fast Turnaround

Disk & Dupe	500	1000	5000
5.25" DS/DD	55	50	47
5.25" DS/HD	98	92	88
3.5" DS/DD	82	79	75
3.5" DS/HD	192	178	165

Prices Include Sleeves

DUPLICATION

**(800) 426-0247
PRINCETON
DISKETTE**

1008 Britannia Ave. # P, Princeton, NJ 08542

CIRCLE 767 ON READER SERVICE CARD

DUPLICATION EXAMINATION



A virus on your master disk could
be fatal to business. At your request,
Formats will examine your disk
before duplication. Absolutely free.

Labeling • Packaging • Printing Services
Highest Quality • Quick Turnaround
If you prefer in-house duplication, we sell top
brand duplication and labeling equipment.

**FORMATS
UNLIMITED INC.**

East Farmingdale, NY • 1(800) 645-8461
(516) 249-9200 • FAX: (516) 249-9273

CIRCLE 769 ON READER SERVICE CARD

To place your ad in

**PC MAGAZINE
Classified**

Call (212) 503-5115
or (800) 825-4ADS

Calling about an ad? Say you saw it in

PC Magazine Classified

PC CLASSIFIED

DISKETTE COPY SERVICES



CORPORATE DISK COMPANY™

CD TECHNOLOGIES, INC. • CD MARKETING, INC.

TAPE AND DISKETTE DUPLICATION

"THE ONE STOP SHOP FOR SOFTWARE DEVELOPERS"

STOP going to 5 different suppliers!

It can all be done with one easy phone call.

"You have to make but one phone call to the Corporate Disk Company and can consider the job done."

In Illinois (708) 439-DISK
Nationwide 1 (800) 634-DISK

© 1989 by CD Marketing Inc.

CIRCLE 770 ON READER SERVICE CARD

Our Services Include:

- Printed Sleeves & Labels
- Printed Binders & Slipcases
- Printed Documentation Pages
- Diskette Silk Screening Process
- Duplication Equipment
- Low Cost Diskettes

SUPPLIES

QUALITY TONER CARTRIDGE REMANUFACTURING

- 20% More Toner
- Darker Print
- 100% Guaranteed
- Replacement drums now available
- We Buy Empties

Laser Research, Inc.

9741 M Southern Pine Blvd
Pharmcity, N.C. 28127

1-800-462-7143

\$39.95

SHIPPING INCLUDED

CIRCLE 774 ON READER SERVICE CARD

What PC Magazine Classified is all about—

BIG CIRCULATION.

An astounding audience of 786,000+* brand specifiers, more PC product buyers than any other publication delivers. Virtually every PC Magazine subscriber has the expertise and authority to specify brands of personal computers for their companies.

BIG SCOPE.

Advertising in PC Magazine Classified works in a big way. PC Magazine's enormous scope is one reason—but there are many other big reasons why advertising campaigns succeed in PC Magazine Classified.

PC Magazine Classified takes advertisers' volume sales message to the biggest audience, and supports that message in an editorial environment that encourages direct response buying.

BIG RESULTS.

PC Magazine Classified gets results. Advertising in PC Magazine Classified compels buyers to act, producing an average 16,462 inquiries per issue (an average 146 inquiries per advertiser per issue). Bottom line, PC Magazine Classified promotes active direct response spending, generating as much as \$200 million in sales revenue through the Classified section alone.

Want to start fully utilizing this gigantic marketing tool? Call your PC Magazine Classified Account Representative for more information or to place your ad, 212-503-5115 or 800-825-4237.

Source: Beta Research Study, 1988
*BPA Audit December, 1990

INSURANCE



SAFEWARE

INSURES YOUR COMPUTERS

Full replacement of hardware, media, purchased software. As low as \$49 yearly. Covers fire, theft, power surges, other accidents. Blanket coverage; no list of equipment needed. Call for information or immediate coverage

1-800-848-3469
Local (614) 262-0559

SAFEWARE, The Insurance Agency Inc.
2929 N. High Street, P.O. Box 02211
Columbus, OH 43202

CIRCLE 771 ON READER SERVICE CARD

SUPPLIES

TONER CARTRIDGES

TESTED • GUARANTEED • 24-HR. TURN.

HP DeskJet Refills! RECONDITIONED HP, Apple, Canon, QMS, etc.

Save Money • Colors Water - Proof Ink

• MICR Toner Available •
Atlanta, GA Office Also!

SHARP Z-Series Copiers \$45

NEW

NEW TONER CARTRIDGE SPECIAL!
Canon Brand Series II/III toners, min. of four, C.O.D., VISA/MC/AMEX only. **\$79.95**

New Drum for Series II & III, - up to 10 Recond. - ask!

Ship. extra, C.O.D. (\$3.75),
Credit Card Surcharge

1-800-239-4027

ADVANTAGE LASER PRODUCTS

1-800-722-2804 (GA)

2216 University Blvd
Tuscaloosa, AL 35401

CIRCLE 772 ON READER SERVICE CARD

TONER

LASER QUIP

7645 Washington Ave. S.
Edina, Minnesota 55435

OPC kits, toner, & supplies for HP, NEC, Ricoh, Qume, Hitachi, Toshiba, Dataproducts, & many more.
• Franchises Available

We will rebuild your cartridge or one from our stock.
Services from:

\$41.50

800-777-8444

CIRCLE 773 ON READER SERVICE CARD

To place your ad in
PC Magazine Classified
Call (212) 503-5115 or (800) 825-4ADS

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category and include Reader Service numbers to allow fast, easy response.

RATES:

1 issue—\$600, 3 issues—\$550, 6 issues—\$510, 12 issues—\$480, 17 issues—\$460, 22 issues—\$450. Multiple-ad per issue rates also available. Prepayment must accompany each insertion. VISA/MC welcomed.

AD FORMAT:

PC Magazine will design and typeset each BusinessCard ad. Advertisers should furnish type-written copy. Ads include: 1) Headline (one line, initial caps=30 characters maximum, all caps=25 characters maximum), 2) Descriptive copy (5 lines, 225 characters maximum), 3) Company name (same specifications as headline), and 4) Address and telephone number (two lines, 40 characters per line). Sorry, no logos, artwork or camera-ready ads.

DEADLINES:

PC Magazine is published 22 times a year. (bimonthly except for July and August). The BusinessCard closing is approximately two months prior to issue date. Please send copy and payment to: PC Magazine BusinessCard, One Park Avenue, 3rd Floor, New York, NY 10016, ATT'N: Vickie Pinsky. For more information, call Vickie Pinsky at 800-825-4237 or 212-503-5120, FAX: 212-503-5860.

HARDWARE/CD-ROM

CD-ROM SALES & MANUFACTURING

CD-ROM•WORM•Magneto-Optical
IBM & MAC CD-ROM Discs
Custom Hardware Manufacturing
International Worldwide Sales•Dealer Programs
Complete IBM & Mac Products Catalog Available

CD ROM, INC.

1667 Cole Blvd•Ste. 400•Golden, CO 80401
Tel: 303-231-9373•Fax: 303-231-9581

CIRCLE 1 ON READER SERVICE CARD

EXPANSION UNITS

AWARD BIOS ROMS

Upgrade your IBM XT, AT, or XT/286/386
Compatible. Add support for 3.5" 1.44Mb
Floppies, 101/102 Keyboard F11 & F12 keys,
ESDI and IDE Hard Drives.—Authorized Award
Distributor.

KOMPUTERWERK

851 Parkview Blvd. Pittsburgh, PA 15215
800 423-3400 • (412) 782-0384

CIRCLE 2 ON READER SERVICE CARD

RENTALS

PC COMPUTER RENTAL

The #1 national discount computer rental company in the U.S. Offices in all major cities.
Featuring IBM, Apple and Compaq—plus a complete host of peripherals. Call us for a solution to your short term computing needs.

PC COMPUTER RENTAL CORP.

National Sales Division
1-800-765-4727

CIRCLE 3 ON READER SERVICE CARD

SOFTWARE/ACCOUNTING

PARADOX(tm) ACCOUNTING

These options in a customizable system, no modules. Checking, Invoice/AR, Purchase/AP, Inventory, G/L-full depts-writer, EE/Sales, Quattro/123 interface. Source avail. Demo \$35, Single-user \$150/275, Network \$295/495.

MIKE OLMSTED, CPA

PO Box 19968; So. Lake Tahoe, CA 95706
(916)544-6778

CIRCLE 4 ON READER SERVICE CARD

START YOUR S/W BUSINESS

Prof., Comp., full-feat. installed bus. prog. (Ret. val. \$2000) Auto rep., hotel, P.O.S.; prog. only, \$85 ea., inc. guide to mktg. prog. Source code (dBase dial.) \$285 ea., inc. guide to create own bus. & EXE prog. Demo & broch. \$15.

PYRAMID SOFTWARE CORP.

2598 Oxford St. Vancouver, B.C.,
Canada, V5K 1N1 (604) 254-1182

CIRCLE 5 ON READER SERVICE CARD

BACKUP SYSTEMS

New Approach to Backups

Analyze, select and sort disk contents by file name, date, size and directory. Then do intelligent selective file backup, cleanup or transfer. Use standard DOS formats and media. Software \$25.00 check/MO.

EAG Systems

P.O. Box 1345, Alameda, CA 94501
(415)865-0190

CIRCLE 6 ON READER SERVICE CARD

BUSINESS

ORDERS MGMT SOFTWARE

MICRO-POINT. For distributors, brokers and jobbers. *SALES & PURCHASE ORDERS*ACKNOWLEDGEMENTS*INVOICES*STATEMENTS*CHECKS*SHIPG LABELS*COMMISSIONS*SALES TAXES*GENERAL LEDGER*ACTIVITY TRACKING**

Micro Assistance, Inc.

509-255-9220 FAX 509-255-9455
P.O. Box 157 Liberty Lake, WA 99019-0157

CIRCLE 7 ON READER SERVICE CARD

BUSINESS TIME MANAGEMENT

Staff Scheduling Simplified!

WHO WORKS WHEN® automates the tedious task of employee scheduling. Features: 24-hr scheduling, multiple shifts/stations, rotations, skill levels, employee preferences; Job Code/Station/Team parameters. Prints 11 reports. \$895.

Newport Systems

P.O. Box 3705 Bellevue, WA 98009-3705
(800)782-1233 • Fax:206-455-4895

CIRCLE 8 ON READER SERVICE CARD

DATA BASE

dBASE file access from C/C++

Build a multi-user, 85k, dBASE compatible application using pulldown menus, popup windows, and data entry. Then port your application to UNIX, Microsoft Windows or OS/2 without changing any code. \$295 with source. FREE DEMO.

Sequiter Software Inc.

Box 5659, Str. L, Edmonton, Ab. Can. T6E5V1
Call (403) 448-0313 Fax (403) 448-0315

CIRCLE 9 ON READER SERVICE CARD

EDUCATION

DERIVE® A Mathematical Assistant

Combines power of computer algebra with 2 & 3D plotting & menu-driven interface. Does symbolic & numeric equations, calculus, trig, vector & matrix algebra, & more. Required: PC compatible computer, 1 floppy diskette drive & 512K. Only \$250.

Software Warehouse, Inc.

3615 Harding Avenue, Suite 505
Honolulu, HI 96816 (808)734-5801

CIRCLE 10 ON READER SERVICE CARD

AUTHORING SYSTEM

Develop educational programs, limited only by your imagination. Include animation, graphics, sound, variable tracking, multiple branching, and more. Create stand-alone EXE's. Easy to use. No royalties. For IBM/Compatibles.

RIDGEWOOD SOFTWARE

P.O. Box 409, Glenview, IL 60025
(800) 243-4724

CIRCLE 11 ON READER SERVICE CARD

ENGINEERING

EArchitects/Engineers

AEMAS is designed for architects/engineers/professional firms monitoring project costs. Modules include job cost, pr, a/p, a/r, g/l, invoicing, personnel scheduling, report generator. Runs on Dos, Xenix, Novell, AIX.

DATA-BASICS

11000 Cedar Rd., Cleveland, OH 44106
216-721-3400

CIRCLE 12 ON READER SERVICE CARD

ENTERTAINMENT/GAMES

ADULT VGA SOFTWARE

Stop Paying High Prices for Adult Software!
We offer the Best in Adult VGA Software at Lowest Prices. Visa & MasterCard Accepted. Movies, Games, Pictures; 200+ Disks in Stock! (You must be 18 or older to order.)

CLEARLIGHT SOFTWARE

P.O. Box 1411, Milwaukee, WI 53201
(414) 962-2616

CIRCLE 13 ON READER SERVICE CARD

SPORTS HANDICAPPING SOFTWARE

Thoroughbred shareware prog.\$8. Commercial horse racing & greyhound handicapping: \$32.95, \$52.95, \$67.95, \$77.95. Up to 17 entries: class, speed, times, odds, track, post, stretch, finish. Pro Football.\$42.95. MC/VISA. Free info.

SOFTWARE EXCHANGE

P.O. Box 250002-PC, W. Bloomfield, MI 48325
(313)626-7208 Orders 1-800-527-9467

CIRCLE 14 ON READER SERVICE CARD

FINANCIAL

TAKE CONTROL OF YOUR FINANCES!

w/Maiden Account Manager II home/office check-book accounting SW. Featuring: running balances, versatile reports w/editor, password security, on-line help, calculator, graphs & more! EZ to learn & use! Only \$49.95+S&H. 30-day. MBG Order Today!

MAIDEN FINANCIAL SOFTWARE

P.O. Box 5058
Laurel, MD 20726-3058 (301) 776-5828

CIRCLE 15 ON READER SERVICE CARD

FLOW CHART

Windows flowcharter \$129

RFFlow 2.0 is a professional drawing tool for flowcharts and org charts. Requires Microsoft Windows 3.0. 100 shapes auto adjust in size. Diagonal lines and curves. Auto line routing and re-routing. Call for free trial disk.

RFF Electronics

1053 Banyan Court, Loveland, CO 80538
Phone: 303-663-5767 Fax: 303-669-4889

CIRCLE 16 ON READER SERVICE CARD

GRAPHICS

PEN PLOTTER EMULATOR

FPlot turns your printer into an HP pen plotter. Fast hi-res, no jagged lines. Vary line width, color. Screen preview - zoom, pan. Works with CAD, graphics programs. Supports most printers. NEW v3. \$119+\$3 S&H. VISA/MC/Chk/MO.

FPlot Corporation

24-16 Steinway St., Suite 605
Astoria, NY 11103 • 718-545-3505

CIRCLE 17 ON READER SERVICE CARD

INVENTORY

INVENTORY MANAGEMENT

Stock-Master 4.0, com. grade system, has Stock Status Rptg, PO Write & Track, Trend Analysis, QC Rptg, Trans Hist Detail Analysis, Multi Loc support, BOM, Matl Req Planning, Serial/Lot No Track, Quote/Ord/Inv Prep.

Applied Micro Business Systems, Inc.

177F Riverside Ave, Newport Beach, CA 92663
714-759-0582

CIRCLE 18 ON READER SERVICE CARD

MAILING PROGRAMS

WHY SPEND \$299 TO SAVE 5¢ ?

Because you can save 5 cents on every piece of mail you send. Postage Saver On A Disk prints addresses + Postal Bar Codes, taking advantage of U.S. Postal rate incentives. Order, call, or write now.

POSTAGE SAVER ON A-DISK

3248 Matthews, Ft. Worth TX 76118
1-800-888-0259

CIRCLE 19 ON READER SERVICE CARD

Merge/Purge DBase Mailing Lists!

DEDUPE III pre-collects duplicates using your criteria, then removes obvious dupes and/or targets probable dupes for you to approve or change. Will also Merge/Purge 2 lists. Fast and Easy to Use - ONLY \$65.

CARPENTER CRAFT, INC.

33 Bearfort Road
West Milford, NJ 07480

CIRCLE 20 ON READER SERVICE CARD

Mail Order Business Made Easy!

"Mail Order Master" contains all the routines to run your Home Business. Features include Invoicing, Super Database, Inventory Control, UPS Manifest, Sales Reports, Bulk Mail Sort + lots more. IBM Compatible. \$399 Demo \$15

THE MARSHALL WEINER CORP.

1700 Catalina Ave., Seal Beach, CA 90740
(800)874-4656 USA & Canada

CIRCLE 21 ON READER SERVICE CARD

FREE ZIP Code Catalog!

ZIP+4; Carrier Routes; ZIP Lookup; Locate nearest dealer; Select ZIPs within a radius; Clean up mailing lists; ZIP Code and Phone Location Databases; & More. Save postage, reduce costs! CALL or write for FREE ZIP Code Catalog.

MELISSA Data Company

32118-8A Paseo Adelanto
San Juan Capistrano, CA 92675 (800)443-8834

CIRCLE 22 ON READER SERVICE CARD

MEDICAL

PRACTICE BILLING

MD VersaForm, flexible, ledger based design, billing package. Programmable; customizable reports, files, and screens; includes database mgmt system and full source. LAN support. \$995-single user. Free literature and demo.

Applied Software Technology

591 W. Hamilton Ave., Ste. 201, Dept. 99
Campbell, CA 95008 (800)678-1111 Ext.99

CIRCLE 23 ON READER SERVICE CARD

MUSIC

Recorded Music Management Sys.

For the serious music collector. Catalog, Organize, Track Music & Video Collection. Print labels, reports. Unlimited capacity, lookup on 100's of fields of info \$59.95. C/Crds.

MUSICWARE

5934 Royal Ln Ste 1114, Dallas, TX 75230
(214) 692-6552 (214) 369-3840 FAX

CIRCLE 24 ON READER SERVICE CARD

MIDI INTERFACE CARDS

Run 100+ music programs. Record and play back with MIDI instruments for composition, sequencing, transcription, music printing, live performance, music instruction, and multi-media use. From \$119, Visa/MC accepted.

Music Quest, Inc.

Box 260963, Plano, TX 75026-0963
1-800-876-1376 Fax: 214-881-7408

CIRCLE 25 ON READER SERVICE CARD

Make Music with your Computer!

Find out how you can record and play music, compose, notate, and learn to play your favorite songs on your personal computer. It's easy and fun. Call or write for free catalog of MIDI products:

Passport Designs

Dept. W, 625 Miramontes,
Half Moon Bay, CA 94109 415-726-0280

CIRCLE 26 ON READER SERVICE CARD

PREVENTIVE MAINTENANCE

FLEET/EQUIP MAINTENANCE

A preventative maintenance & report system for vehicles/equip that need periodic service. Some features: Scheduled service reports, Service history. Full operating cost reports, User defined codes, Cost per mile/hour reports.

Ram Systems, Inc.

224 Causeway Blvd., La Crosse, WI 54603
(608) 782-8130 FAX: (608)784-5115

CIRCLE 27 ON READER SERVICE CARD

PROGRAMMERS TOOLS

BASIC PROGRAMMING TOOLS

Crescent Software offers many tools for QuickBASIC and PDS, all with tutorials and full source. Assembly routines, graphics, screen design w/data entry, BASIC TSR's, and much more. No royalties. Call or write for our catalog.

Crescent Software

32 Seventy Acres, W. Redding, CT 06896
Orders: 800-35-BASIC, Tech: 203-438-5300

BASIC PROGRAMMERS

Call us for an excellent assortment of add-on products for QB and BASIC PDS. We specialize in assembler routines that make your programs faster & smaller, as well as a wide assortment of productivity tools that save you time. No royalties.

MicroHelp, Inc.

4636 Huntridge Drive Roswell, GA 30075
(800) 922-3383 (404)594-1185

CIRCLE 29 ON READER SERVICE CARD

OPT-TECH SORT/MERGE

High Performance Sort/Merge/Select utility. Run as a standalone utility or call as a subroutine. Supports most languages and filetypes. Unlimited file size, multiple keys and much more! MS-DOS \$149. OS/2, Unix \$249.

Opt-Tech Data Processing

P.O. Box 678 - Zephyr Cove, NV 89448
(702) 588-3737

CIRCLE 30 ON READER SERVICE CARD

REAL ESTATE

Property Management

Software for managing residential, commercial, condos, etc. Basic version for owner/manager-\$495, Deluxe for professional managers-\$1,195, Network-\$2,395. Includes check writing, recurring expenses, G/L, management reporting.

YARDI SYSTEMS, INC.

819 Reddick Street, Santa Barbara, CA 93103
(805) 966-3666

CIRCLE 31 ON READER SERVICE CARD

PROPERTY MANAGEMENT

Since 1978 over 7,500 users of our software have found it comprehensive, flexible & easy to use. We offer systems to manage: Commercial/Residential/Condominium/Homeowners/Assoc./Mini-Storage Facilities. For info. & prices call:

REALTY AUTOMATION

11365 East Shore Drive, Hayden Lake, ID 83835
(208) 772-3259

CIRCLE 32 ON READER SERVICE CARD

RELIGION

CHURCH SOFTWARE

The HELPER I, a leading church management package since 1984. Tracks membership, pledges, contributions, and attendance. Includes fund accounting general ledger. Complete packages from \$595. Call or write for free demo.

TECHNOLOGY CONCEPTS, INC.

2104 Edgewood Dr • W Lafayette, IN 47908
(800) 477-5824 • (317) 583-3211

CIRCLE 33 ON READER SERVICE CARD

SCIENTIFIC

Scientific SW - free catalog

A great selection of scientific software products for plotting, non-linear curve fitting, chemical equilibrium calculations, simulation, statistics, symbolic algebra, and more. Prices range from \$150-\$1000. Call: 1-800-942-MATH

MicroMath

Salt Lake City, UT 84121-0550

CIRCLE 34 ON READER SERVICE CARD

Scientific Software & Systems

Featuring Jandel Scientific's SigmaPlot, SigmaScan, PC3D, TableCurve & PeakFit. Also, MS-DOS video measurement systems for science & industry at mail-order prices.

Northcoast Scientific Computing

21 Ward St. #7, Larkspur, CA 94939
(800)228-0318 or (415)927-4948(CA)

CIRCLE 35 ON READER SERVICE CARD

REAL-TIME GRAPHICS TOOLS

Software tools for Turbo C, Microsoft C and Turbo Pascal. Routines include Fast Scrolling Graphs, Process Control Bargraphs, Meters, Gauges, PID Control, FFT's, T/C Linearization and Curvefitting, and Mouse Support. \$200+shipping.

QUINN-CURTIS

21 Highland Circle, Needham, MA 02194
2: (617)449-6155 Fax: (617) 449-6109

CIRCLE 36 ON READER SERVICE CARD

MS-DOS GRAPHING UTILITY

RPlot allows quick graphing of scientific results by simply typing "plot" followed by the data file name(s). Numerous options are available. Major displays & printers are supported. Also callable from C. Only \$79.

RSoft, Inc.

345 Riverside Drive • Suite 2G
New York, NY 10025 • (212)666-0959

CIRCLE 37 ON READER SERVICE CARD

Software for Chemists

•PERIODIC PLUS comp. chem. ref. •Chem./Thermodynamic properties of all 105 elements •Full color graphics for element property comparisons •Organic Spectroscopic Data, Conversion Tables & more! •IBM Compatibles, 30 Day Guar. \$99.95

SPECTRAL INTELLIGENCE CORP.

30 E. Swedesford Road, Malvern, Pa. 19355
215-889-1349 FAX: 215-889-1630

CIRCLE 38 ON READER SERVICE CARD

STATISTICS

NCSS 5.x Series - \$125

"Best value & easiest to learn/use" PC-Week. Menus/Spreadsheet. Means, etc. Regression, t-tests, ANOVA. Factor, cluster & discriminant. Cross tabs. Nonparametrics. Histograms. Plots. Reads ASCII/Lotus. Many extra modules.

NCSS

865 East 400 North Kaysville, UT 84037
Phone: 801-546-0445 FAX: 801-546-3907

CIRCLE 39 ON READER SERVICE CARD

Business & Statistical Software

Quality Control • Surveys & Questionnaires • Experimental Statistics • Decision Analysis • Optimization • Sales & Market Forecasting Project Planner • Multivariate Analysis • Inventory • Econometrics • Biometrics FREE PRODUCT GUIDE.

Lionheart Press, Inc.

P.O. Box 379, Alburg, VT 05440
Fax: (514) 939-3087 Tel: (514) 933-4918

CIRCLE 40 ON READER SERVICE CARD

Statistical Advisor Speaks English!

Statistical Navigator Professional™ lets you describe your research goal in plain english, guides you to the appropriate statistical analysis. Natural language interface, detailed report, extensive hypertext help, & pull-down menus. \$150+s/h.

The Idea Works, Inc.

607 Jackson St., Columbia, MO 65203
800-537-4866/314-875-5827/Fax 314-875-5812

CIRCLE 41 ON READER SERVICE CARD

UTILITIES

EGW-BASIC PROGRAMMERS

Write Professional programs for IBM PCs with all the Bells & Whistles! Includes Source for 46 Subroutines & Prog: Bar Menu, Shell Sort, Screen Mgr, Dir Tree,....
BASIC Toolbox-\$29.50 + 3.50 S/H. MC & VISA

MIPS, Inc.

Box 3072 • Hammond, LA 70402
800-345-3808

CIRCLE 42 ON READER SERVICE CARD

Break 640K! VRAM™ (\$49)

creates 32M memory by turning disk space or extended memory into expanded! VRAM/plus (8 utilities/\$99): HRAM creates 944K DOS memory, min-mem frees memory used by TSRs, Diskpack backs up 10M to 2 disks, more. Call! 30-day grt.

Biologic

7950 Blue Gray Ct Manassas, VA 22110 USA
703-368-2949 (703-361-8251 fax)

CIRCLE 43 ON READER SERVICE CARD

WINDOWS

Personal Measure

Finds performance bottlenecks in PCs. "can enhance anyone's diagnostics artillery". W. Roach, 8/89 PC Mag. NOW measure and tune Windows 3.0! Most major LANs. Shows you how your apps spend time. \$125+s&h (5.25" or 3.5") MC/VISA.

Spirit of Performance, Inc.

73 Westcott Road, Harvard, MA 01451
tel: 508-456-3889, telex 6503571400

CIRCLE 44 ON READER SERVICE CARD

1 WINHELP 2 WAPE

1 Provides fast and easy to use on-line help system for programmers developing MS Window applications 2 Provides services like administrative, editing, code generation, help and ability to design the user interface of the application

Intersoft, Inc.

5285 S.W. Meadows Road, Suite 389
Lake Oswego, OR 97035 (503) 639-3555

CIRCLE 45 ON READER SERVICE CARD

MISCELLANEOUS/BAR CODING

Labeling & Barcoding Software

WYSIWYG design / Built-in data base w/file import / Scalable fonts / Many barcodes / Variable code densities, ratios, heights / Batch printing / PCX image support / Dot matrix, laser, thermal printers / \$259 and up.

LabelSoft™

P.O. Box 488, Perrysburg, OH 43552
(419) 874-8502 FAX (419) 874-9313

CIRCLE 46 ON READER SERVICE CARD

BOOKS/CATALOGUES/PUBLICATIONS

Answer Book for C Programming

This is an ind. answer book for the following textbook: PROGRAMMING IN C. revised edition by Stephen Kochan Hayden Books, 1988. The ans. book covers all exercises. Every program includes listing, input & output. \$13.95+\$2 S&H.

Lexington Computer

49 Waltham St Lexington, MA 02173
(617) 863-1534 tele/fax

CIRCLE 47 ON READER SERVICE CARD

DATA CONVERSION

Move HP Data + Programs to PC's

Translate Hewlett Packard Basic programs to run in Microsoft C on your PC. Read Hewlett Packard ASCII, Binary data files on IBM PC and compatibles. Call for demo, data sheet, catalog.

Oswego Software

P.O. Box 310 Oswego IL 60543
708-554-3567 FAX 708-554-3573

CIRCLE 48 ON READER SERVICE CARD

SUPPLIES

COMPUTER BATTERIES

Nickel Cadmium, Lithium, Lead Acid & Alkaline Batteries for P.C. Boards, UPS, Printers & Laptop Computers. Custom Build Battery Packs. MC/V

EVS SUPPLY

1350 Arapaho #126, Richardson, TX 75081
1-800-776-5267 FAX 214-231-5351

CIRCLE 49 ON READER SERVICE CARD

Deskjet Refills

Send your empty Deskjet black ink cartridges (in their original protective packaging) and a check for \$8 per cartridge. We will return them refilled by US mail to any US address you specify.

Beth Kinnmark

1860 Sherman Avenue, #2-NE; Evanston, IL 60201-3732
708-475-5387

CIRCLE 50 ON READER SERVICE CARD

MARKETING POWER

Is yours when you place your message in this space. Reach 786,000+ buyers of all kinds of PC products. Give your business card PC Magazine Marketplace Power.

BusinessCard

Call 1-800-825-4237 today.

READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE	READER SERVICE NUMBER	PRODUCT	COMPANY	PAGE
AFTER HOURS				423	Micrografx U.S. Maps Special Edition Clip Art, Windows Version	Micrografx Inc.	236	615	Mitsubishi HC3505SK	Mitsubishi Electronics America Inc.	370
415	Test Drive III: The Passion	Accolade	505	422	MapArt	MicroMaps Software	236	616	Mitsubishi XC-3310C	Mitsubishi Electronics America Inc.	373
417	Stunts	Broderbund	505	601	DrawArt Professional	Migraph Inc.	242	617	Mitsubishi XC-3715C	Mitsubishi Electronics America Inc.	373
416	Stunt Driver	Spectrum Holobyte	505	608	ProArt Professional Art Library	Multi-Ad Services	272	702	Little Mouse/PC	Mouse Systems	42
418	Ivan 'Ironman' Stewart's Super Off Road	Virgin Mastertronic	505	607	Presentation Task Force	New Vision Technologies Inc.	270	703	WaveLAN	NCR Corp.	46
COMPUTERS				545	Click & Clip 500	Studio Advertising Art	222	618	NEC DM-3000P	NEC Technologies Inc.	374
709	Bell Computer 386WB- 40	Bell Computer Systems	33	603	Images With Impact!	3G Graphics Inc.	252	440	ViewFrame Spectra	nVIEW Corp.	55
438	Ultrathin 386SX	Commax Technologies Inc.	55	546	ClickArt EPS	T/Maker Co.	222	442	TPD/PC-MCA	Radius Inc.	55
707	IBM PS/2 Model L40 SX	IBM	36	609	Totem Color Clip Art (Slide Service Bureaus)	Totem Graphics	273	READ ONLY			
437	Micro Express NB5620	Micro Express	55	619		Autographix Overnight Slide Service	284	396	Dvorak's Guide to DOS & PC Performance	Osborne/McGraw-Hill	65
GRAPHICS				620		Genigraphics Corp.	288	397	The Personal Computer Book	Prelude Press	65
(Presentation Graphics)				621		Kinetic Presentation Centers	293	SOFTWARE			
401	Applause II, Version 1.5	Ashton-Tate	123	622		MAGICorp	299	436	PowerEdit	Artificial Linguistics Inc.	55
399	Show Partner F/X, Version 3.6	Brightbill-Roberts & Co.	134	623		SlideMasters Inc.	302	431	After Dark, Version 1.0	Berkeley Systems	48
414	35mm Express, Version 4.35	Business & Professional Software Inc.	184	(Film Recorders)				435	3-D Charts To Go!	BLOC Publishing Corp.	49
413	Presentation Express, Version 1.0	Business & Professional Software Inc.	184	425	Agfa ProColor	Agfa Matrix Division	322	701	Turbo Pascal for Windows, Version 1.0	Borland International	38
402	CA-Cricket Presents, Version 1.3	Computer Associates International Inc.	124	426	LFR	Lasergraphics Inc.	324	705	HP Intellifont for Windows and Fontware for the HP LaserJet III	Hewlett-Packard	50
412	Presentation Team, Version 2.0	Digital Research Inc.	182	427	Polaroid Digital Palette CI-3000	Polaroid Corp.	328	432	Intermission, Version 1.0	ICOM Simulations	48
398	IBM Storyboard Live!, Version 1.0	IBM Desktop Software	134	428	Montage FR1	Presentation Technologies	329	708	EzTape PM	Irwin Magnetics Systems Inc.	55
409	Kinetic Words, Graphs & Art, Version 2.10	Kinetic Presentations Inc.	171	HARDWARE				700	Language Assistant	Microtac Software	60
405	Freelance Graphics for OS/2, Version 1.0	Lotus Development Corp.	133	610	Barco Multidata OCM 2846	Barco Inc.	356	444	PanaRender	Panacea Inc.	55
406	Freelance Plus, Version 3.01	Lotus Development Corp.	145	611	Barco Multidata OCM 3346	Barco Inc.	358	448	ProKey for Windows	Rosesoft Inc.	60
403	Charisma, Version 2.01	Micrografx	130	612	Barco Multidata SCM 2846	Barco Inc.	359	710	Professional Write Plus	Software Publishing Corp.	33
410	Microsoft PowerPoint, Version 1.0	Microsoft Corp.	174	433	Type City	Bitstream Inc.	44	449	Statgraphics, Version 5.0	STSC Inc.	60
407	Harvard Graphics, Version 2.3	Software Publishing Corp.	160	430	FlashCard RC1000 Series	Cardinal Technologies Inc.	49	704	Hotshot Imagebase, Version 1.0	Symsoft Corp.	50
400	VirtualVideo Producer, Version 3.5	V_Graph Inc.	134	443	CAT Color Converter	Computer Aided Technology Inc.	55	446	TitusDOS	Titus Communications Corp.	55
404	DrawPerfect, Version 1.1	WordPerfect Corp.	132	439	Liteshow II	Infocus Systems Inc.	55	445	Skylight	VentanaWorks	55
408	ImageStation	Yale Graphics	164	706	Microsoft BallPoint Mouse	Microsoft Corp.	42	450	Volkswriter 4, Version 2.0	Volkswriter, Inc.	60
411	Pixie, Version 2.0	Zenographics Inc.	178	441	PixieView PC/11	Mirror Technologies	55	447	Witzend Editor	Witzend Software	55
(Clip Art)				613	Mitsubishi AM-3151A	Mitsubishi Electronics America Inc.	363	PRODUCTIVITY			
602	ImageFile	Applied Microsystems	242	614	Mitsubishi AM-3501R	Mitsubishi Electronics America Inc.	363	DEPARTMENT			
542	ArtRight Image Portfolios	ArtRight Software	212	PROGRAM NAME / DESCRIPTION				PAGE			
544	ArtWare Graphics Pak	ArtWare Systems Inc.	217	Lab Notes	The IDE Interface and the QUEST for Better Hard Disk Performance.						379
547	Clipables: The EPS Graphics Library	C.A.R. Inc.	227	Utilities	Restore Your Windows 3.0 Sessions with WINSAYER.EXE.						391
543	Arts & Letters	Computer Support Corp.	214	Environments	Comparing the OS/2 2.0 and Windows 3.0 Palette Managers.						399
548	Cliptures	Dream Maker Software	232	Power Programming	Dynamic Data Exchange and the Clipboard in Windows.						405
549	DeskTop Art	Dynamic Graphics	236	Windows	Uninstalling WIN APPS.						415
605	Moonlight Artworks Collection	Hired Hand Design	257	Windows	Accessing extended memory after installing HIMEM.SYS.						415
550	Digit-Art	Image Club Graphics	238	Windows	Check compatibility before updating device drivers.						415
606	PicturePak	Islandview/MGI	263	Databases	Generate several reports from just one report form in FoxPro.						421
424	U.S. Maps-3D	Kinetic Presentations Corp.	236	Databases	Track dBASE IV's report generator into accepting macro substitution.						421
421	Freelance Maps, Version 3.0	Lotus Development Corp.	236	Spreadsheets	Pop up a monthly calendar in 1-2-3.						425
604	Micrografx ClipArt	Micrografx Inc.	255	The Working Word	A macro that flashes the time right on your screen.						429
				The Working Word	A macro-created menu that lets you change directories in WordPerfect.						429
				User-to-User	How to repeat DOS commands without retyping them.						433
				User-to-User	A batch file that identifies file types.						433
				Languages	Upgrade to the new version of Power BASIC for network support.						437
				Languages	2DIR.C lets you compare two directories.						437
				Tutor	Configuring your system.						441
				Tutor	Speed up your hard disk with FASTOPEN and SMARTDRIVE.						441
				Connectivity	Manage users by limiting their disk space.						445
				Connectivity	Two ways to share data between separate locations.						445
				Connectivity	How to connect two screens and keyboards to the same PC.						445
				Connectivity	Environment variables make it easier to share network printers.						445
				Connectivity	Finding the best long-distance connection.						445



COMING UP

■ WINDOWS AND PM GRAPHICS UTILITIES

You wouldn't want to be without a graphics utility for your graphical environment. *PC Magazine* reviews *ImagePrep* and *DoDOT* which do file conversion and screen capture under *Windows 3.0*, plus *Collage PM* which provides similar services in the *Presentation Manager* environment.

■ RELATIONAL DATABASES

PC Magazine Labs sets out to discover which relational database packages provide the best end user interfaces for fast data access as well as the most powerful programming languages for complete query control. New benchmark tests push these 17 packages to their limits.

■ HP LASERJET IIISI

PC Labs takes an in-depth look at Hewlett-Packard's new 17-ppm networking laser printer: the HP LaserJet IIISI. We'll compare HP's new entry to Kodak's new multifunction printer, the Ektaprint 7016, and QMS's PS-2210, which won Editors' Choice in our November printer issue.

■ ENDURANCE TESTS

They were the best of last year's 33-MHz 80386-based PCs, but how have they done for us lately? *PC Magazine's* reviewers take a long, hard look at the CompuAdd 333T, the Dell 333, the Polywell Poly 386-33PT, and the Zeos 386/33—our four 33-MHz 386 Editors' Choice winners from 1990. We'll examine these machines inside and out.

■ UNIX SERVICES FOR DOS-BASED PCS

Now that DOS's networking and communications skills have improved, how do you get better communication between PCs using DOS and systems relying on Unix? In this review, we look at products that will transform a Unix PC into a server for a network of DOS-based PCs. The result is that you get better integration of your various computer platforms, and better control of data. ■

GET NONSTOP SYSTEMS INFORMATION — AND 2 DISKS FREE!



PC MAGAZINE is the one publication you can trust to keep you up-to-date on the latest developments in the ever-changing world of computing.

Subscribe now to make sure you don't miss a single product report or productivity-enhancing tip.

■ One year (22 issues) for \$29.97. **SAVE 54%.**

■ Two years (44 issues) for \$49.97. **SAVE 62%.**

And if you order now, you'll also get our exclusive 2-DISK "BEST OF PC MAGAZINE'S UTILITIES"—FREE with your paid subscription!

Don't delay. Call toll-free today to claim your savings and FREE "BEST OF PC MAGAZINE'S UTILITIES!"

1-800-289-0429

Please add \$32 per year for postage outside the U.S. U.S. currency only. Canadian GST included. Please allow 30 days for delivery. Disks will be shipped upon payment.

R/S# ADVERTISER

PRODUCT

PAGE#

R/S# ADVERTISER

PRODUCT

PAGE#

ACCOUNTING SOFTWARE

471	Bell Atlantic Corp.
263	Macrole Inc.
358	Peaschee Software

DATABASE MANAGERS

233	Alpha Software
285	Borland International
178	Canon Software
370	Microm
	Oracle
119	Programmer's Paradise
199	XTREE-Div of Executive Systems

FILE SYSTEMS & ACCESS METHODS

286	Fifth Generation
-----	------------------

FINANCIAL PLANNING SOFTWARE

	Intuit Software
--	-----------------

INFORMATION MANAGERS

	Lotus Development Corp.
291	Map Info
356	PowerUp! Software Corp.

LANGUAGES

285	Borland International
	Mark Williams
119	Programmer's Paradise

OPERATING SYSTEMS/ENVIRONMENTS

	Hewlett Packard/Network Systems Group
	Mark Williams
	Microsoft
	Microsoft
	Microsoft
119	Programmer's Paradise
338	Quinterdeck Office Systems
255	Wordstar International

PROGRAM DEVELOPERS/GENERATORS

178	Canon Software
181	Spinaker Software Corp

PROJECT MANAGEMENT

148	Primevera Systems
	Soltec Corporation
181	Spinaker Software Corp

STATISTICAL SOFTWARE

154	Mathsoft Inc.
366	STSC

UTILITIES

330	Application Techniques
129	Avery
328	Buffalo Products
182	Central Point Software
	Fifth Generation
236	Fifth Generation
241	NDC Computer Corporation
328	NDC Computer Corporation
313	Netix Software
170	Multisoft Corporation
119	Programmer's Paradise
264	Symantec
199	XTREE-Div of Executive Systems

WORD PROCESSING SOFTWARE/AIDS

143	Lotus - Word Processing Div.
275	NBI, Inc.
	Pacific Data Products
119	Programmer's Paradise
	Software Publishing
289	SWFTE International

CAD/CAM

475	American Small Business
280	Humandad

SPREADSHEET/TEMPLATES

287	Borland International
	Computer Associates
119	Programmer's Paradise

DESK TOP PUBLISHING

196	Aldus Corporation
	Pacific Data Products
135	Umag Corporation

DATA ENTRY SOFTWARE

135	Umag Corporation
-----	------------------

VERTICAL MARKET SOFTWARE

731	Stac Electronics
-----	------------------

FONT SOFTWARE

289	Pacific Data Products
	SWFTE International

PRESENTATION SOFTWARE

	Microsoft
--	-----------

DIAGNOSTIC SOFTWARE

133	On Track Computer Systems
338	Quinterdeck Office Systems

MAPPING SOFTWARE

291	Map Info
	Software Publishing

WINDOWS SOFTWARE

241	NDC Computer Corporation
328	NDC Computer Corporation
	Hewlett Packard Network Sys.
143	Lotus - Word Processing Div.
381	Map Info
	Microsoft
	Microsoft

THIRD	414
ACCOUNTING SOFTWARE	376
ACCOUNTING SOFTWARE	24-25

DATA BASE MANAGER	189
PARADOX	59
PROFESSIONAL DEVELOPER	96
PERSONAL R BASE	109
DATABASE	82
MAIL ORDER	455
XTREE GOLD	375

DISKLOCK PC	94
-------------	----

QUICKEN	89
---------	----

AGENDA 2.0	221
MAP INFO DATABASE	4
CALENDAR CREATOR PLUS	301

PASCAL	436
COHERENT UNIX OPERATING SYSTEM	77
MAIL ORDER	455

H-P NEW WAVE	216
COHERENT UNIX OPERATING SYSTEM	77
WINDOWS 3.0	72-73
WORD FOR WINDOWS	2-3
WINDOWS SOFTWARE	310-311
MAIL ORDER	455
OPERATING SYSTEMS	126-127
WORDSTAR LEGACY	191

PROFESSIONAL DEVELOPER	96
SPINAKER PLUS 2.0	202

PROJECT MANAGEMENT SOFTWARE	378
PROJECT SCHEDULER	154-155
SPINAKER PLUS 2.0	202

PC CAD 2.5	304
STATISTICAL SOFTWARE	14

PIZZAZ PLUS	271
LASERPRO SOFTWARE	16
PRINTING & FILE UTILITY TRANSFER	308
ANTI-VIRUS SOFTWARE	29
FASTBACK PLUS	129
FASTBACK PLUS	131
FILE APPS. MICRO APPS	336
FILE APPS. MICRO APPS	337
METRODM	151
PC KWIK PAK V2	184
MAIL ORDER	455
ANTI-VIRUS	328
XTREE GOLD	375

AMI WORD PROCESSOR	223-226
WORD PROCESSING UNDER WINDOWS	377
FONT CARTRIDGES	137-144
MAIL ORDER	455
PUBLISH	239
GLYPHIX	37

DESIGNCAD 3D	185
MENUEQUIN	349

QUATTRO PRO	57
SUPERCALC	5
MAIL ORDER	465

PAGEMAKER	333
FONT CARTRIDGES	137-144
DESKTOP PUBLISHING	419

OCR SOFTWARE	419
--------------	-----

STACKER	97
---------	----

FONT CARTRIDGES	137-144
GLYPHIX	37

POWERPOINT	125
------------	-----

ANTI-VIRUS SOFTWARE	419
MEMORY MANAGEMENT	126-127

MAP INFO DATABASE	4
MAPPING	22-23

FILE APPS. MICRO APPS	336
FILE APPS. MICRO APPS	337
H-P NEW WAVE	216
AMI WORD PROCESSOR	223-226
MAP INFO DATABASE	4
WINDOWS 3.0	72-73
WORD FOR WINDOWS	2-3

Microsoft	
NBI, Inc.	
Programmer's Paradise	
Umag Corporation	
Wordstar International	

DATA COMPRESSION SOFTWARE

731	Stac Electronics
-----	------------------

MULTITASKING SOFTWARE

338	Quinterdeck Office Systems
-----	----------------------------

COMPATIBLE KEYBOARDS

	Northgate Computer Systems
	Northgate Computer Systems

BACKUP SOFTWARE

	Fifth Generation
236	Fifth Generation
119	Programmer's Paradise

DISK BACKUP & TAPE DRIVES

187	3M Data Storage Products
473	Colorado Memory Systems, Inc.
378	Omega Corporation
495	Wayward Electronics
	Singate
381	Tec Data Storage

HARD DISKS

147	Plus Development
731	Stac Electronics

COMPUTERS/COMPATIBLES

519	Acer America Corporation
	Acme Computers, Inc.
	Advanced Logic Research
	Austin Computers
	Bus Computer
	Comp. Discount Warehouse (MMC)
	COMP. U.S.A.
	Compu-Ad
	Copart U.S.A., Inc.
	Dallworld
474	Dell Computer Corporation
472	Dell Computer Corporation
	Dell Computer Corporation
536	Dell Computer Corporation
	Digital Equipment Corporation
	EPS Technologies
479	Ergo Computing Inc.
	Gateway 2000
	IBM Corp
480	Inversion Computer Corporation
480	Inversion Computer Corporation
179	Jamaco Electronics
	NEC Corporation
157	NEC Technologies, Inc.
	Northgate Computer Systems
	Northgate Computer Systems
	Northgate Computer Systems
	Northgate Computer Systems
	Northgate Computer Systems
	Paradise Computer Products Ltd
	PC Brand
	PC Zones Int'l Inc.
	PC Zones Int'l Inc.
316	Samsung Information Systems
183	Standard Computer (CPU)
268	Swar Technologies
312	Tandon Computer Corporation
508	Tandon Computer Corporation
744	Tandon Computer Corporation
333	Tandon Computer Corporation
381	Tangent Computer, Inc.
306	Telemerit
379	Tenex Computer Express
121	Toshiba of America T2000SX
177	Tri-Star Computer
211	Ultra Comp
308	Xircor
	Zee International
	Zee International
	Zee International
	Zee International
	Zee International
	Zee International
	Zee International
	Zee International
	Zee International
	Zee International

INPUT DEVICES

524	FTG Data Systems FT1000
179	Jamaco Electronics
220	Kanagangon Microware Ltd.
492	Kye International
	Microsoft
	Microsoft
120	Mouse Systems

PROGRAMMERS TOOLS UTILITIES

	Mark Williams
119	Programmer's Paradise
338	Quinterdeck Office Systems

MULTIFUNCTION BOARDS

524	FTG Data Systems FT100
-----	------------------------

ADD-ON BOARDS

126	Capital Equipment Corporation
524	FTG Data Systems FT1000
740	Intel Corporation
180	Sigma Data
916	Television Inc.

SCANNERS DIGITIZERS

492	Kye International
120	Mouse Systems
135	Umag Corporation

PRINTERS

129	Avery
-----	-------

POWERPOINT	125
WINDOWS SOFTWARE	310-311
WORD PROCESSING UNDER WINDOWS	377
MAIL ORDER	455
OCR SOFTWARE	419
WORDSTAR LEGACY	191

STACKER	97
---------	----

MULTITASKING SOFTWARE	126-127
-----------------------	---------

KEYBOARDS	369
KEYBOARDS	371

FASTBACK PLUS	129
FASTBACK PLUS	131
MAIL ORDER	455

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DATA STORAGE PRODUCTS	276
JUMBO TAPE	404
BERNOULLI BOX	254-255
DATA BACK-UP	432
DRIVES	256
TURBOTAPE TAPE	380

DELL PC'S	511-512
DELL PC'S	C5-C8



ADVERTISING SALES STAFF

One Park Avenue, New York, NY 10016
(212) 503-5100

DISPLAY ADVERTISING

NATIONAL

Nancy Newman -
Director of Sales /
Telemarketing
(212) 503-5204

Telemarketing Manager
MaryJo Boudinot
(212) 503-5128

Senior Advertising Coordinator
Allyson Dubin
(212) 503-5044

Advertising Coordinator
Christine Holsten
(212) 503-5264

Ast. Advertising Coordinator
Lynette Stiffa
(212) 503-5107

EASTERN

Al Di Guido - Eastern
Advertising Manager
(212) 503-5310

MA, NH, VT, ME, RI.

District Manager
Sloan Seymour
(617) 393-3055
10 President's Landing, Mystic Center
Medford, MA 02155
Account Representative
Todd Anderman
(212) 503-5132

CT, NY, NJ, PA

District Manager
Michael Bird
(212) 503-5307
District Sales Representative
Lisa Friedman
(212) 503-5149
One Park Avenue, 4th Floor
New York, NY 10016
Sr. Account Representative
Joyce Wasserman
(212) 503-5333
Account Representative
Stephanie Brzozowski
(212) 503-5675

DE, MD, DC, VA, WV, NC, SC, AL,
MS, TN, AR, KY, GA, FL

District Manager
Scott J. Seltz
District Sales Representative
Mark Crafts
3405 Piedmont Road, Suite 460
Atlanta, GA 30305
(404) 239-9780
Account Representative
John DeSpirito
(212) 503-5130

CENTRAL

Robert Diftler - Central
Advertising Manager
(312) 346-7666

NE, WI, IL, IN, KS, MN, MO, OH,
MI, IA, ND, SD, Canada

District Manager
Stephen Dress
District Manager
Jay Overbye
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
(312) 346-7666
Account Representative
Maureen Dooley
(212) 503-5126
Account Representative
Chris Sullivan
(212) 503-5047

TX, OK, LA, NM

Dallas Office
5956 Sherry Lane, Suite 625
Dallas, TX 75225
(214) 691-6934
Account Representative
Karen Keavey
(212) 503-5104

WESTERN

CA (Los Angeles)

District Manager
Mary Ariotto (213) 351-1811
District Manager
Paul Klein (213) 351-1812
3530 Wilshire Boulevard, Suite 645
Los Angeles, CA 90010
(213) 351-1810
Sr. Account Representative
Beth Gartenberg
(212) 503-5040

WESTERN

Ted Welch - Associate
Publisher/West Coast
(415) 378-5525

CA (San Francisco & North), ID,
OR, WA

District Manager
Mike Kisseberth
(415) 378-5527
District Sales Representative
Rick Vandervoorn (415) 378-5523
110 Marsh Drive, Suite 103
Foster City, CA 94404
Account Representative
Deborah Gatton
(212) 503-5129

CA (Santa Barbara to South San
Francisco), WY, MT, AK, CO, UT

District Manager
Pete Foster (415) 378-5521
District Manager
Kim Dawson (415) 378-6859
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5520
Account Representative
John Zaterka
(212) 503-5041

CA (San Diego & Orange County),
AZ, NV, HI

District Manager
David Lynn
District Sales Representative
Robin Kofsky
18500 Von Karman Avenue, Suite 510
Irvine, CA 92715
(714) 852-8001
Sr. Account Representative
Michael Hatherill
(212) 503-5113

For more information
regarding *display*
advertising please call:
(212) 503-5100 or
1-800 PCMAG AD

CLASSIFIED ADVERTISING

Director, Classified Sales
Paul Stafford
Group Advertising Director
Kathryn J. Cumberlander

Sales Manager
Vickie L. Pinsky

Support Manager
Monica B. Dixon

Sr. Advertising Coordinator
Wanda D. Brown

Production Director
Anne Brockinton

Production Manager
Carolyn Bingham

Production Supervisor
Bessi Dion

Production Coordinator
Mary C. Murawinski

AR, CA (209, 707, 916), CT,
IL, MI, MO, NH, NJ, NM, NV,
OR, WA

Sr. Account Manager
Kathleen Morris
212-503-5125

AL, CA (415, 818), FL, GA, ID,
KS, VT

Charles Boyar
212-503-5118

CA (619, 714, 805), IA, IN, LA, TN,
TX, WI, WY, OVERSEAS

Karen Cosgrove
212-503-5156

CA (213), DC, MS, NC, SC, UT,
VA, WV

212-503-5176

CA (408), DE, HI, KY, MD, ME,
MT, NE, MN, OK

C. Wesley Walton
212-503-5117

AK, AZ, CO, MA, ND, NY, OH,
PA, RI, SD, CANADA

Jelane Westra
212-503-5175



PC MAGAZINE MARKETPLACE
3rd Floor, One Park Avenue,
New York, NY 10016

For more information
regarding *classified*
advertising please call:
(212) 503-5115 or
1-800 825-4237

After Hours

Products for the Leisure Side of Personal Computing

Accolade's Latest Test Drive Offers a Choice of Three Exotic Sports Cars

GAMES

By Bill O'Brien

It's difficult to create a good sequel when you're trying to top an excellent program. Accolade succeeded in doing just that, however, with *Test Drive II: The Duel*, which surpassed the high expectations raised by the original *Test Drive*. Now they've tried for the triple crown with *Test Drive III: The Passion*. Accolade made an outstanding attempt, sometimes with spectacular results, but *Test Drive III* doesn't share the greatness of its predecessors.

There you sit with three of the world's most exotic cars at your command. You could select a Lamborghini Diablo with 485 horses, twin cams, 48 valves, and fuel injection. Even with four-wheel drive, it goes 0 to 60 miles per hour in under 4 seconds and has a top speed of 202

mph. It's bright red, of course.

Don't like Italian cars owned by Chrysler? How about a Chevy CERV III. It's a ZR-1 platform with four cams, 32 valves, and twin turbos peaking at 650 horsepower and blasting to 60 mph in 3.9 seconds. This cool blue package paints a blur across the road at a top speed of 225 mph.

All right, so you like foreign cars. The most sedate choice is a Pininfarina Mythos. It's not much, really. Just a 12-cylinder Ferrari platform that chugs up to 60 mph in 6.2 seconds and gasps out a top speed of 180 mph. After you make your choice, the two you didn't select race against you (or you can have three friends take turns trying to drive better than you do).

The Mythos is very competitive despite its relatively modest stats, because *Test Drive III* isn't a game of speed. Your course isn't the Autobahn or the long

cross-country stretches of I-80. Instead, it's a series of five driving segments, with a mixture of terrain that runs from Paso Robles through Monterey, the San Luis Reservoir, Merced, Mariposa, and finally lands you in Tioga Pass at Yosemite.

Both time and speed count for points during each of the segments. The Diablo's 4WD should keep you stable, as will the CERV III's 1.1g lateral acceleration. The low top speed of the Mythos should be enough to keep you from getting too crazy, and that's important. While you never run out of fuel, you can be ticketed by the police (you can't outrun them, but you can outsmart them). In any event, you are still just flesh and bone.

You can damage your car and degrade its performance by hitting sign posts, shrubs, or chickens, or by venturing onto prolonged off road excursions. But if you hit a cow, a tree, a building, another car, or a bridge abutment, you'll crash. You can meet a similar fate by driving over the edge of a mountain, splashing into a lake, or racing

GAMES

Take to the open road with *Test Drive III*

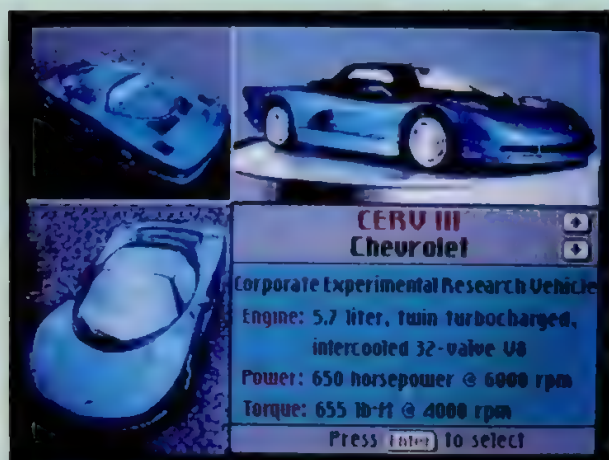
Get down and dirty with *Super Off Road*

Loop the loop with *Stunts and Stunt Driver*

up the face of a hill so fast that you eventually plummet back down. And each time you crash, you lose a life. You start with five lives, and things go downhill from there. You gain a few lives as you begin each new segment, so there is some reward for finishing—even last.

Death isn't the only reality here. *Test Drive III* is perhaps Accolade's best use of special effects to date. Planes fly overhead, and butterflies splat against your windshield (your wipers will clear them as well as the rain and snow). Every scenic

CONTINUES



The Chevrolet CERV III is among the fire-breathing road monsters you can take out for a spin with *Test Drive III*.



Painstaking attention to detail distinguishes *Test Drive III*, which sports some of Accolade's best graphics ever.

After Hours

Accolade

CONTINUED

component—the hills, the buildings, the ocean, and even the trees and the shrubbery—is rendered in painstaking detail. It's no wonder that *Test Drive III* runs in VGA mode (forget the other modes, they're just not worth the loss of resolution) and won't run at all if you have less

than 570K of available memory.

So what keeps it from being great? Steering. The program runs best on either a 20-MHz or 25-MHz 80386-based PC. Below that speed, it gets tedious very quickly, and above that speed it just gets very quick. But no matter what kind of system you're running it on, and no matter at what speed your car is traveling, *Test Drive III* lacks the road feel and accurate steering response that was present in past incarnations of the game.

Accolade has released an upgraded version (1.1) with some of the oversteering removed, but it isn't enough. You can grow accustomed to the overreaction of the steering and learn to compensate to a great degree, but it's just not right and you will be frustrated at times.

Even with its steering problems, however, you almost have to buy *Test Drive III* for its many nuances and subtle visual delights. Perhaps Accolade will issue a final recall and fix the

steering properly; that would make the program perfect. But barring that, *Test Drive III* has to be described as a beautiful but flawed gem.

List Price: *Test Drive III: The Passion*, \$59.95. **Requires:** 640K RAM; EGA, VGA, MCGA, or Tandy 16-color graphics; DOS 2.1 or later. 8-MHz or faster processor strongly recommended. Accolade, 550 S. Winchester Blvd., San Jose, CA 95128; 408-985-1700.

CIRCLE 418 ON READER SERVICE CARD

Super Off Road Pits You Against Rough Roads And Nasty Opponents

GAMES
by Bill O'Brien

You might not actually get dirty, but you will find yourself grinding your teeth and tensing your muscles as you compete in Virgin Mastertronic's \$39.95 PC version of *Ivan "Ironman" Stewart's Super Off Road* arcade game.

Stewart is a 20-year veteran of one of the toughest kinds of motorsport: off-road racing. He is a team driver for Toyota and participates in an indoor version of this maniac's sport called Stadium Racing. He attracted the attention of Leland, an arcade game maker, and lent his expertise and endorsement. Soon after, the coin-op version of *Super Off Road* began gobbling quarters at malls everywhere.

In Virgin Mastertronic's PC version, you compete in one of five stadium courses, complete with ditches and hydro barriers to keep you on the dirt. Because this isn't a simulation, the game surface appears as a three-quarter bird's-eye view with the foreground of the track at the bottom of the screen and the background at the top.

The VGA implementation is excellent; you can almost count the grains of dirt. Even the little half-inch trucks show incredible detail, especially when one runs up the side of a barrier and almost flips over.

Up to three players can be involved simultaneously (two

using the keyboard and one on a joystick); all three race against each other and the computer-controlled Ironman. It's best to avoid the multiple turns, jumps, and pitfalls to prolong the durability of your truck during a heat. While you're trying to find the best line down a straight or through a turn, the rest of the field is attempting to bump and push its way through you.

The object of *Super Off Road* is to take a fairly stock truck and,

by winning races and picking up bonus purses, accumulate money. But you don't save a dollar of it. Between heats you spend as much as you can in the speed shop to boost your top end and road-handling ability. That's the only way to keep winning, and win you must. Three losses put you on the sidelines.

You always have enough fuel for your heat, but you can augment your track-speed by using Nitros, the game version of nitrous oxide. Buy Nitros for \$10,000 each, or pick them up as you drive, but you'll need them to beat the Ironman.

Ivan Stewart is an old man by racing standards, so you might

expect a hard-charging young Turk to easily bat him into the wall. Ask Robby Gordon, his young Toyota teammate, and you might get a different picture. Play the Ironman's *Super Off Road* game and you'll find out for yourself. If you need even more realism to hold your attention, then try having a friend throw some dirt in your face while you're playing.

List Price: *Ivan "Ironman" Stewart's Super Off Road*, \$39.95. **Requires:** 512K, CGA, EGA, or VGA, DOS 3.x or later. Virgin Mastertronic, 18001 Cowan St., #A, Irvine, CA 92714; 714-833-8710.

CIRCLE 419 ON READER SERVICE CARD



Between heats in *Super Off Road*, you head for the speed shop to spend your winnings on upgrades for your truck (at left).

In *Ivan "Ironman" Stewart's Super Off Road* (at right), you get a taste of the stadium version of off-road racing.

After Hours

Two Stunt Car Simulators Offer Hair-Raising Thrills And Spills for PC Drivers

GAMES
by Bill O'Brien

If you just can't drive 55, two new car simulations will have you driving like a madman in no time. *Stunt Driver*, from Spectrum Holobyte, and *Stunts*, from Broderbund, let you test yourself against various hazards at the highest speeds your skills (and good sense) will allow. These programs differ from standard driving simulations in that they emphasize the manmade mayhem found in obstacle courses.

When you start *Stunt Driver*, the classic hood scoop and blue racing stripe on your ride tell you that you are piloting a '66 Shelby Mustang. You won't feel your head whip back and hit the seat, but you will notice the 350 horsepower as you accelerate off the starting grid and onto the track, moving closer to the 140-mph mark on the speedometer. If you're not getting there fast enough you can always add a little juice by hitting the nitrous oxide button.

As you enter a turn, several things happen at the same time;

the combination can be murder. As you wrench the steering wheel to accommodate the radius of the turn, you must either brake or accelerate, or do some combination of both. If you enter the turn too quickly or choose the wrong angle of entry, your tires lose traction and you hear the sound of skidding as your car starts to slide. While that's happening, you also notice that the image on your screen is not only moving sideways with the skid, but also tipping from side to side in response to what would normally be body roll under those conditions. Too much body roll during a skid, of course, flips your car over.

That's just a sample of what's in store for you at the "trainee" level on the easiest course you'll find in *Stunt Driver*. There are also rookie and expert levels with which to contend; experience gained through each level does not make your life easier. In fact, once you have qualified on a course (five courses come standard and there is a very easy-to-use course editor included) by running under the fast track time, you can race against any or all of

three speedy opponents.

The name of the game is *Stunt Driver*, and naturally Spectrum doesn't want to bore you with just plain old tarmac tracks. In the course of a race you'll be challenged by oil slicks, 360-degree loops, jumps, and the downright over-aggressive driving tactics of your opponents. During a race your car can be damaged, and its top speed drops as damage accumulates. You'll need to pull into the pits for repairs to get back to full potential (keep an eye on your pit crew, they're hilarious). And if you happen to fall out at the top of a 360-degree loop, you'll be the proud driver of a very, very small subcompact hitching a ride on the back of a tow truck.

LOOKS AND SOUNDS GOOD

Spectrum Holobyte has done an excellent overall job on *Stunt Driver*. The VGA-level graphics are outstanding and more than a little strange in spots (select a Tokyo background for your course and try to keep your concentration as you catch a glimpse of Godzilla destroying the city). Caution signs pop up as needed to indicate turn directions and suggested speeds (if you want to lose the race). Sound is also incredible. While *Stunt Driver* supports the Sound Blaster and AdLib boards, Spectrum manages to crank better sound out of the little 2-inch PC speaker than you're likely to hear from any other game currently avail-

able. You'll know what a damaged drive train sounds like before you're done.

Brought to you by the grandfather of Apple gamesters, Broderbund, *Stunts* was written by the same folks who created Accolade's *Test Drive* and *Test Drive II: The Duel*. *Stunts* is fun regardless of how you categorize it, but it feels as if it's lost somewhere between an arcade game and a simulation.

The premise is similar to that of *Stunt Driver*, but you have a wider choice of exotic cars, including the Lamborghini LM-002, a four-wheel-drive off-road vehicle that really has no place with a Porsche 962, a Ferrari GTO, a Jaguar XJR9, and others of similar ilk. You could also question the inclusion of an Audi Quattro in such rarified automotive company.

Five courses are included, as is a very versatile course editor that gives you an unlimited number of additions. There are no skill levels per se, but you do learn and improve as (or if) you complete each course. Six opponents wait in the wings, ready to engage you in single combat. Each has a different skill level, ranging from "Your grandmother could beat him," to "He learned to drive by outrunning cops in New York." For the macho-boy racers in the audience, two women drivers are among the potential competition. They might be the reason why *Stunts* includes the Audi and the LM-002. Give these women any of the better cars and you're likely to be beaten, badly.

But the emphasis in *Stunts* is on the stunts, not on the driving. The sections of clear roadway are used to tie together loops, broad jumps across deep chasms of empty space, death-defying climbs and drops in altitude, and 360-degree sideways rolls. Because the stunts are more challenging, the crashes are more spectacular. Broderbund has always been known for squeezing the most out of a graphics environment, and their VGA implementation here is no exception. If you miss a roll or a loop you'll see the exceptionally fine detail of the scenery shift and change as your car

CONTINUES



As you streak to victory in *Stunt Driver*, you must cope with numerous obstacles, including your competitors.

ADVERTISERS' INDEX

COMPANIES

R/S#	ADVERTISER	PAGE	R/S#	ADVERTISER	PAGE	R/S#	ADVERTISER	PAGE
167	3M Data Storage Products	276	241	hDC Computer Corporation	336	*	PC Zones Int'l. Inc.	258-259
234	3X USA	300	528	hDC Computer Corporation	337	*	Pacific Data Products	137-144
519	Acer America Corporation	323	149	Headland Technology (Video 7)	166	746	Panasonic OA	54
*	Acma Computers, Inc.	66	313	Helix Software	51	122	Panasonic OA	435
165	Advanced Logic Research	32	*	Hewlett Packard Network Sys.	216	145	Paradise Computer Products Ltd.	463
197	Advanced Micro Devices	467	*	Hewlett Packard Peripheral Group	180-181	358	Peachtree Software	24-25
196	Aldus Corporation	333	*	Hewlett Packard Peripheral Group	228-229	147	Plus Development	175
233	Alpha Software	189	260	HumanCAD	349	222	Polaroid Corp.	307
475	American Small Business	185	*	IBM Corp.	68	356	PowerUp! Software Corp.	301
330	Application Techniques	271	*	IBM Corp.	148-149	148	Primavera Systems	378
336	Arlington Computer Products	454	*	IBM Corp.	215	119	Programmer's Paradise	455
*	Ashton Tate	178-179	*	IBM Corp.	410-411	259	QMS	43
727	ASP Computer Products	76	272	In Focus Systems, Inc.	186-187	164	QMS	45
540	ATI Technologies Inc.	106	749	Intel Corporation	298-299	141	QMS	47
337	ATI Technologies Inc.	388	*	Intel Corporation	381	338	Quarterdeck Office Systems	126-127
509	Austin Computers	9-13	374	Intel Corporation	383	369	Roland Digital	183
129	Avery	16	*	Intel - PCED	289	290	Rose Electronics	28
471	Bell Atlantic Corp.	414	512	Intel - PCED	291	349	S&W Electronics	468
287	Borland International	57	192	Integrated Information Tech.	403	316	Samsung Information Systems	401
285	Borland International	59	*	Intuit Software	89	*	Seagate	256
295	Borland International	436	378	Imagem Corporation	254-255	193	Sharp Professional Products	165
328	Buffalo Products	398	480	Iverson Computer Corporation	94-95	160	Sigma Data	192
481	Bulldog Computer Products	456	480	Iverson Computer Corporation	97	*	Software Publishing	22-23
273	Bus Computer	457	127	JDR Micro Devices	453	*	Software Publishing	239
144	Calcomp	292	179	Jameco Electronics	319	539	South Coast Electronics	468
522	Calera Recognition Systems	424	220	Kensington Microwave Ltd.	213	346	Speciality Software	407
187	Canon, USA	385	492	Kye International	240	171	Spectragraphics Corporation	325
128	Capital Equipment Corporation	88	143	Lotus - Word Processing Div.	226	181	Spinnaker Software Corp.	202
319	Cardinal Technologies	427	*	Lotus Development Corp.	218-219	731	Stac Electronics	97
162	Central Point Software	26	*	Lotus Development Corp.	221	365	STSC	14
*	Checkfree Technology Inc.	176	263	Macola Inc.	376	163	Standard Computer (CPU)	98-99
178	Clarion Software	96	291	Map Info	4	268	Swan Technologies	61-64
473	Colorado Memory Systems, Inc.	404	*	Mark Williams	77	299	SWFTE International	37
109	Comp. Discount Warehouse (MMC)	464-465	154	Mathsoft Inc.	304	264	Symantec	326
132	COMP. U.S.A.	70-71	495	Maynard Electronics	432	312	Tandon Computer Corporation	194-195
*	Compu-Add	52-53	225	MicroWarehouse Inc.	208-211	508	Tandon Computer Corporation	196-197
205	CompuClassics	458	101	Microgate	21	744	Tandon Computer Corporation	198-199
300	Computability	459	*	Micrografix	74	333	Tandon Computer Corporation	200-201
*	Computer Associates	5	*	Micrografix	387	391	Tangent Computer, Inc.	29
372	Copam U.S.A., Inc.	346	370	Micronim	109	381	Teac Data Storage	390
729	Corel Systems	193	*	Microsoft	2-3	477	Tektronix	253
172	CTX International, Inc.	372	*	Microsoft	72-73	206	Telemart	90-91
*	Curtis Manufacturing	103	*	Microsoft	125	306	Tenex Computer Express	468
747	Cyrix Corp.	351	*	Microsoft	168-169	353	Texas Instruments	39
281	Datasouth Computer Corp.	417	*	Microsoft	280-281	304	Texas Instruments	431
*	Dataworld	18-19	*	Microsoft	310-311	379	Toshiba of America	161-163
536	Dell Computer Corporation	C5-C8	489	Midwest Computer Works	452	121	Tri-Star Computer	17
472	Dell Computer Corporation	296-297	120	Mouse Systems	172	735	Triton Technologies	173
474	Dell Computer Corporation	294-295	170	Multisoft Corporation	164	515	Truevision Inc.	420
*	Dell Computer Corporation	511-512	308	National Design Inc.	382	177	Ultra Comp	40-41
*	Digital Equipment Corporation	234-235	275	NBI, Inc.	377	135	Umage Corporation	419
150	Dresselhaus Computer Products	220	242	NCR Corporation	274-275	367	Universal Data Systems	444
332	Dynamic Microprocessor Assoc.	86	153	NEC Technologies, Inc.	C2-C4, p.1	*	Wordperfect	100
362	Eastman Kodak	241	157	NEC Technologies, Inc.	20	255	Wordstar International	191
*	EPS Technologies	84-85	351	New Media Graphics Corp.	190	211	Xircor	262
479	Ergo Computing Inc.	320-321	*	Northgate Computer Systems	360-362	199	XTREE-Div of Executive Systems	375
539	Event Horizons	468	*	Northgate Computer Systems	364-365	388	Zeos International	30-31
113	Everex	313-317	*	Northgate Computer Systems	367	*	Zeos International	48a-h
*	EXCEL MICRO	466	*	Northgate Computer Systems	369	721	Zeos International	78-79
352	FASTMICRO	448-451	*	Northgate Computer Systems	371	115	Zeos International	80
286	Fifth Generation	94	322	Novell Data Systems	330-331	488	Zeos International	286-287
*	Fifth Generation	129	235	Okidata	354-355	722	Zeos International	92-93
236	Fifth Generation	131	133	On Track Computer Systems	418	*	Zeos International	243-250
382/320	First Source International	466	*	Oracle	82	723	Zeos International	251
524	FTG Data Systems	88	303	PC Brand	338-345			
*	Gateway 2000	113-120	*	PC Connection	264-269			
*	Hard Drives International	469	482	PC Power & Cooling	105			
136	Hayes Microcomputer Products	302-303	*	PC Zones Int'l. Inc.	60-61			

* No Reader Service #. Please call advertiser for information.

After Hours

Stunt Car Simulators

CONTINUED

drops through the air like a stone. The actual impact is not really spectacular, but if you manage to slide along upside down on the hood of your car before you finally hit something, you will get a perspective on driving that you should never experience in real life.

Sound is not *Stunts*' forte. From an AdLib board you'll hear credible—if not exceptionally realistic—road and car noises. If you opt to use the tinny speaker in your PC, you might as well have a tin ear to go along with it. The engine growls louder and faster as the speed of your car increases, but crashes sound almost like someone dropped a Slinky on a steel drum.

Both *Stunt Driver* and *Stunts* offer certain advantages. *Stunt Driver* lets you hone your driving skills on a road course fraught

Stunts comes with an excellently implemented course editor, so you can design your own fiendishly challenging layout.



with obstacles, while *Stunts* gives you some open road between obstacles that you may or may not survive. It's a lot like the difference between driving through Los Angeles and driving in New York City. Then again, people have even been known to enjoy both. It's simply

a question of what sort of mayhem appeals to you.

List Price: *Stunt Driver*, \$49.95. **Requires:** 512K RAM, DOS 3.3 or later, graphics adapter. Spectrum Holobyte, 2061 Challenger Dr., Alameda, CA 94501; 415-522-3584.

CIRCLE 416 ON READER SERVICE CARD

List Price: *Stunts*, \$49.95. **Requires:** 640K RAM for VGA, MCGA, Tandy, or EGA graphics; 512K RAM for CGA and Hercules graphics; DOS 2.11 or later. Broderbund, 17 Paul Dr., San Rafael, CA 94903; 415-492-3500.

CIRCLE 417 ON READER SERVICE CARD

MAKE YOUR BEST CONNECTIONS WITH PC MAGAZINE'S CONNECTIVITY ISSUE

It's the complete guide to defining LAN to LAN and wide area communications, featuring:

- ◆ Access Servers
- ◆ Internal bridges and routers
- ◆ Connection Alternatives: A Tutorial
- ◆ Public Data Networks Overview
- ◆ BBS Multiuser Software

You'll find all this and more in the September 10th issue of PC Magazine.

Advertisers interested in this exciting opportunity should call 800-33 MAG AD now. Ad Close 7/9/91.

After Hours is where PC Magazine readers take their fun and games seriously.



Advertisers interested in reaching them should call 800 33 MAG AD.

COMPUTER IMAGES

Super VGA

1024x768x256

ASTRONOMY • NATURE • SCIENCE
FULL COLOR VIDEO MOVIES
"OTHER HEAVENLY BODIES"

Experience your computer's maximum graphics ability! GIF images for IBM, MAC II, Atari, Amiga, and most other systems in all resolutions from 320x200 all the way to 1024x768x256. States of the art.

TWO WAYS TO BUY OUR IMAGES

32 Hour BBS: 800-697-5104 • You have full unlimited access to 1400 megabytes of images and programs on 24-hour 32-line BBS. Only \$19.95/mo., no uploading restrictions, time limits. No charge to look. Call for 9000 baud modem.

CATALOG MAIL ORDER: 800-697-5104 • Save long distance phone charges. Order anything found on line through our Mail Order Catalog. World-wide shipment. Credit card, cash, check. Same day shipment. US Mail, UPS, FEDEX, airwaybill. Catalog only.

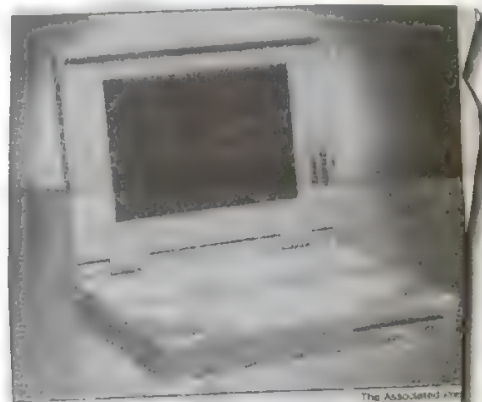
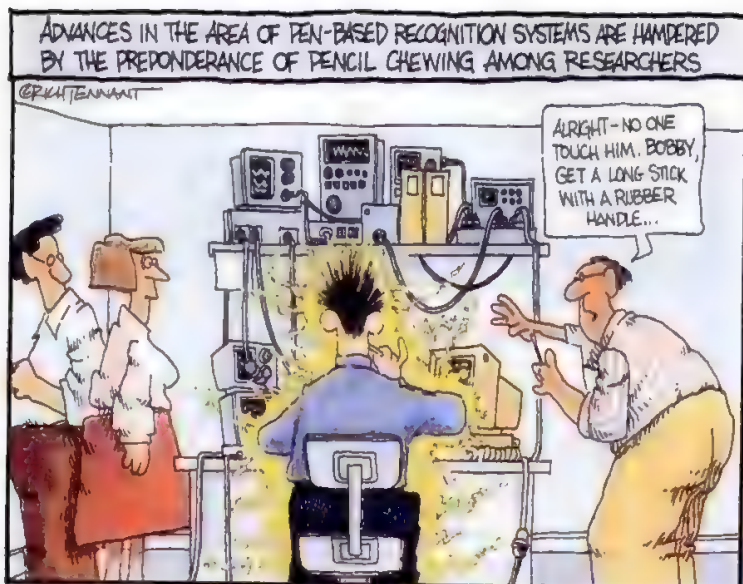
Event Horizons
311 Ave B, Suite 209
Laino Oswego, OR 97055
Information: 503-667-7700

CIRCLE 269 ON READER SERVICE CARD

by
Bill Howard

Abort, Retry, Fail?

The Lighter Side of Personal Computing



Real microprocessing

Compaq's new Notebook laptop computer is 8½ inches by 11 inches in surface area. The notebook-sized half-pound unit is expected to retail for \$5,000 and experts believe it will capture a large corner of the market.

Compaq's new LTE 386s/20 weighs but half a pound, according to the *Dallas Times Herald*, October 16, 1990.

Just Do What Comes Naturally

"Once you have the necessary items, plug the RS-232C connector on the back side of the Mini Modem 2400 into the RS-232C connector on your computer, or terminal, then screw up."

—Users manual, GVC Mini Modem 2400

And what if your name isn't Dave?
From Computer Discount Warehouse
Catalogue, Fall 1990

NEC Intersect™ CDR-72

External CD-ROM Reader

- ✓ Small Footprint ✓ Switchable Power Supply ✓ 350 Msec Access Time
- ✓ Can Be Placed On Its Side To Stand Vertically To Help Dave On Disk Space.
- ✓ 540 MBytes Data Capacity ✓ 400 Msec Seek Time ✓ 150 KBytes Data Transfer Rate

CDW™ Price

NEC

\$646.67

Help Wanted (Good Memory Essential)

"Support Technician, Information Technology (Systems Officer 1) (Schedule 6) \$34,200–38,700 (restricted) Build a career at the plans administration branch, north and east, providing technical and operational support to end users of information technology. You will: install, test all hardware/software; analyse and debug problems; implement security and recovery procedures; analyse user requirements and develop applications; provide support and maintenance of ministry LAN; liaise with information management branch; train end-users and act as back-up for the mainframe computer system (PACS). Location: Toronto."

Help-wanted ad, Ontario Government
Jobmart, October 19, 1990

If your entry is used in *Abort, Retry, Fail?* we'll send you \$50 and a PC Magazine T-shirt. Caution: In case of multiple entries, the postmark date, neatness, and completeness of the entry are considered. Winners this issue: Hank Mishkoff (half-pound LTE 386s/20), Marion Daniels and Trish Chen (mainframe backup), Chad Martin (Help Dave on disk space), William Sam Byassee (then screw up).

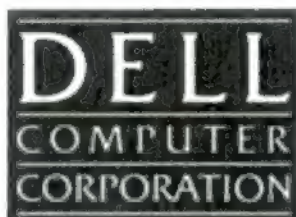
PERFORMANCE, VALUE AND SERVICE.

WE WROTE THE BOOK ON IT.

Send for the newest Dell product catalog, loaded with information on all our award-winning computers, services and prices. Plus, get the details on our newest line of PCs, laptops and turbocharged servers. So return this card today, or call us at (800) 873-1130. In Canada, call (800) 387-5752.

TO ORDER, CALL
800-873-1130
FOR FASTER PROCESSING PLEASE REFERENCE #11BF2
HOURS: 7 AM-6 PM CT M-F 8 AM-4 PM CT SAT

IN CANADA, CALL
800-387-5752



©1991 Dell Computer Corporation. All rights reserved.

GET OUR FREE CATALOG NOW.

Return this postage-free card and we'll mail you the latest Dell Catalog with information on our newest line of PCs, laptops and turbocharged servers. You'll also find out about our award-winning service and unbelievably low prices, so return this card today, or call us at (800) 873-1130. In Canada, call (800) 387-5752.

☐ Please have a Dell Representative call me.

Name: (M) _____
(Please print)

Title: _____

Company: _____
(If Applicable)

Address: _____

City: _____ State: _____ Zip: _____

Type of Business: _____

Approx. # of Employees in Company: _____

Home Phone: () _____

Business Phone: () _____

Fax #: () _____

1. Which products are you most interested in?

- | | |
|--|--|
| ☐ 286-based systems | ☐ UNIX® based systems |
| ☐ 386-based systems | ☐ Laptops/Notebooks |
| ☐ 386SX-based systems | ☐ Other: _____ |
| ☐ i486-based systems | |

2. Are you interested in computer products for:

- ☐ Home ☐ Business ☐ Resale

3. If for resale, please identify your primary customers:

- ☐ General Business ☐ Government ☐ Education ☐ Medical

4. How many PCs does your company plan to purchase in the next twelve months?

Quantity	Timeframe	Quantity	Timeframe
_____	Less than 1 month	_____	6-12 months
_____	1-3 months	_____	More than 12 months
_____	3-6 months		

5. What do you plan to use computer products for?

6. How many PCs do you have installed now at your company?

7. Are you interested in leasing? ☐ Yes ☐ No

AD CODE 51BF2

GET OUR FREE CATALOG NOW.

Return this postage-free card and we'll mail you the latest Dell Catalog with information on our newest line of PCs, laptops and turbocharged servers. You'll also find out about our award-winning service and unbelievably low prices, so return this card today, or call us at (800) 873-1130. In Canada, call (800) 387-5752.

☐ Please have a Dell Representative call me.

Name: (M) _____
(Please print)

Title: _____

Company: _____
(If Applicable)

Address: _____

City: _____ State: _____ Zip: _____

Type of Business: _____

Approx. # of Employees in Company: _____

Home Phone: () _____

Business Phone: () _____

Fax #: () _____

1. Which products are you most interested in?

- | | |
|--|--|
| ☐ 286-based systems | ☐ UNIX® based systems |
| ☐ 386-based systems | ☐ Laptops/Notebooks |
| ☐ 386SX-based systems | ☐ Other: _____ |
| ☐ i486-based systems | |

2. Are you interested in computer products for:

- ☐ Home ☐ Business ☐ Resale

3. If for resale, please identify your primary customers:

- ☐ General Business ☐ Government ☐ Education ☐ Medical

4. How many PCs does your company plan to purchase in the next twelve months?

Quantity	Timeframe	Quantity	Timeframe
_____	Less than 1 month	_____	6-12 months
_____	1-3 months	_____	More than 12 months
_____	3-6 months		

5. What do you plan to use computer products for?

6. How many PCs do you have installed now at your company?

7. Are you interested in leasing? ☐ Yes ☐ No

AD CODE 51BF2

GET OUR FREE CATALOG NOW.

Return this postage-free card and we'll mail you the latest Dell Catalog with information on our newest line of PCs, laptops and turbocharged servers. You'll also find out about our award-winning service and unbelievably low prices, so return this card today, or call us at (800) 873-1130. In Canada, call (800) 387-5752.

☐ Please have a Dell Representative call me.

Name: (M) _____
(Please print)

Title: _____

Company: _____
(If Applicable)

Address: _____

City: _____ State: _____ Zip: _____

Type of Business: _____

Approx. # of Employees in Company: _____

Home Phone: () _____

Business Phone: () _____

Fax #: () _____

1. Which products are you most interested in?

- | | |
|--|--|
| ☐ 286-based systems | ☐ UNIX® based systems |
| ☐ 386-based systems | ☐ Laptops/Notebooks |
| ☐ 386SX-based systems | ☐ Other: _____ |
| ☐ i486-based systems | |

2. Are you interested in computer products for:

- ☐ Home ☐ Business ☐ Resale

3. If for resale, please identify your primary customers:

- ☐ General Business ☐ Government ☐ Education ☐ Medical

4. How many PCs does your company plan to purchase in the next twelve months?

Quantity	Timeframe	Quantity	Timeframe
_____	Less than 1 month	_____	6-12 months
_____	1-3 months	_____	More than 12 months
_____	3-6 months		

5. What do you plan to use computer products for?

6. How many PCs do you have installed now at your company?

7. Are you interested in leasing? ☐ Yes ☐ No

AD CODE 51BF2

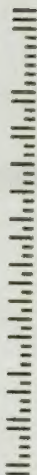
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 6745 AUSTIN, TEXAS

POSTAGE WILL BE PAID BY ADDRESSEE

DELL COMPUTER CORPORATION
DEPT DH
9505 ARBORETUM BLVD.
AUSTIN TX 78759-9860



**COMPAQ
WOULD LIKE
THIS BOOK
BANNED.**

For A Free Catalog Of Dell's New Computers,
Send This Card.



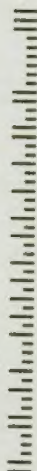
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 6745 AUSTIN, TEXAS

POSTAGE WILL BE PAID BY ADDRESSEE

DELL COMPUTER CORPORATION
DEPT DH
9505 ARBORETUM BLVD.
AUSTIN TX 78759-9860



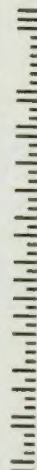
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

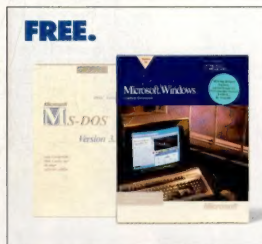
FIRST CLASS MAIL PERMIT NO. 6745 AUSTIN, TEXAS

POSTAGE WILL BE PAID BY ADDRESSEE

DELL COMPUTER CORPORATION
DEPT DH
9505 ARBORETUM BLVD.
AUSTIN TX 78759-9860



EXTRA!



EXTRA!



If you want to find out how to get a 386DX system,
plus one free MB of memory, a free Microsoft™ Mouse, free MS-DOS®,
free Microsoft Windows™ 3.0, the big story is on the following page.

TO ORDER, CALL
800-388-1770

FOR FASTER PROCESSING REFERENCE #11BF1
HOURS: 7 AM-9 PM CT M-F 8 AM-4 PM CT SAT

In Canada call 800-387-5752 for details.
In Mexico call 95-800-010-0664.

DELL
COMPUTER
CORPORATION

PC
MAG
L
I
B
R
A
R
Y

IF YOU WANT A COMPLETE 386DXTM SYSTEM FOR UNDER \$2,500, HAVE WE GOT NEWS FOR YOU.



The Dell 325P 25 MHz 386 System

To find out more, turn the page.

TO ORDER, CALL

800-388-1770

FOR FASTER PROCESSING REFERENCE #11BF1
HOURS: 7 AM-9 PM CT M-F 8 AM-4 PM CT SAT

In Canada call 800-387-5752 for details.
In Mexico call 95-800-010-0664.

DELL
COMPUTER
CORPORATION